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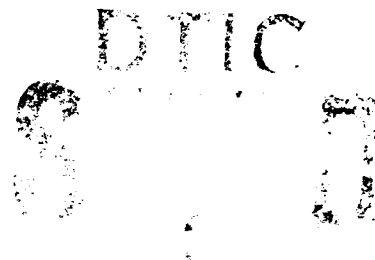


AIR WAR COLLEGE

RESEARCH REPORT



THE FUTURE: CHALLENGES AND OPPORTUNITIES FOR
AIR WAR COLLEGE

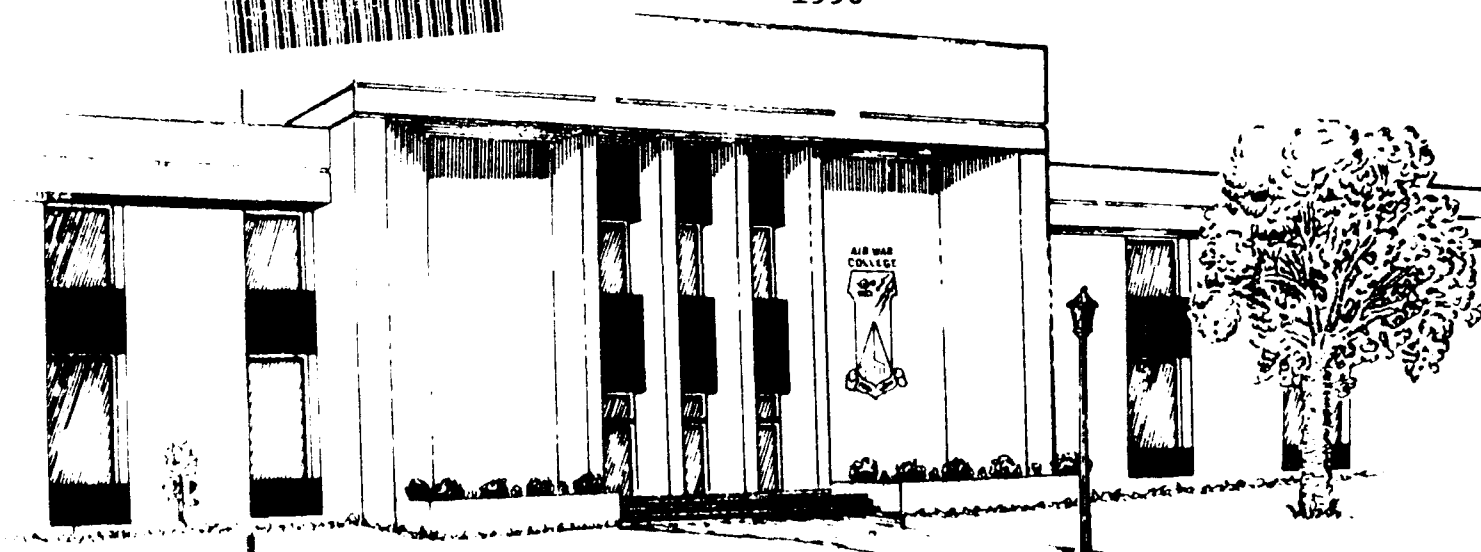


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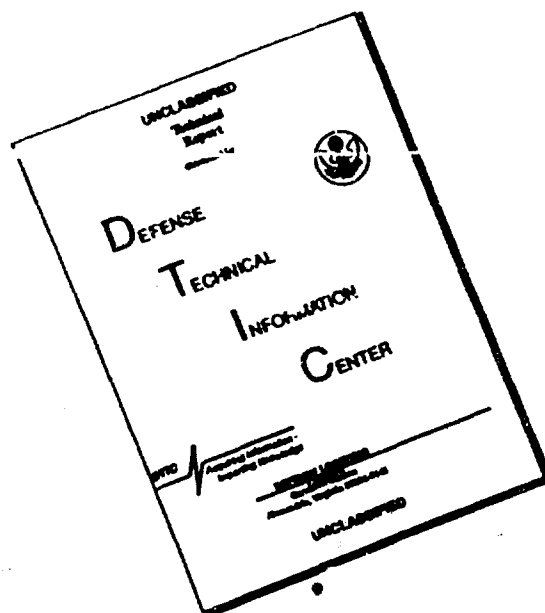
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AIR WAR COLLEGE
AIR UNIVERSITY

THE FUTURE: CHALLENGES AND OPPORTUNITIES FOR AIR WAR COLLEGE

by

Thomas J. Padgett
Lieutenant Colonel, USAF

A DEFENSE ANALYTICAL STUDY SUBMITTED TO THE FACULTY
IN
FULFILLMENT OF THE CURRICULUM
REQUIREMENT



Advisor: Colonel Karen Brantner

MAXWELL AIR FORCE BASE, ALABAMA

APRIL 1990

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EXECUTIVE SUMMARY

TITLE: The Future: Challenges and Opportunities for Air War College
AUTHOR: Thomas J. Padgett, Lieutenant Colonel, USAF

Air University requires each of its units, including the Air War College, to prepare a long-range strategic plan. An effective strategic plan requires an assessment of the future environment in which an activity will operate, so decision makers can seize opportunities and prepare for challenges. To do otherwise weakens the impact and effectiveness of today's decisions. This study explores the probable future in which the Air War College will operate. It develops logical methodology to determine the topics most likely to impact those future operations, determines the proper time in the future on which to focus the research, and uses current and credible research conducted by experts as the basis for determining probable future conditions. The study offers implications and recommendations for the Air War College based on a picture of the future from 1995 to 2000. The ultimate conclusion is that the school must make strategic adjustments to accommodate a rapidly changing environment. Unless the Air War College becomes a partner with the future, it runs the risk of becoming a victim of it.

BIOGRAPHICAL SKETCH

Lieutenant Colonel Padgett has four years of experience in long-range and strategic planning. As Concepts and Analysis Branch Chief in the Air Force Engineering and Services Directorate at the Air Staff, Lieutenant Colonel Padgett developed methods for forecasting the future environment for Engineering and Services operations. His branch reviewed future Air Force weapon systems for Engineering and Services impacts, was the Director's focal point for space, and was the program element monitor for the Engineering and Services research and development budget. Lieutenant Colonel Padgett is a career services officer, has served on two major command staffs in addition to the Air Staff, and has been a squadron commander. He served stateside in the Tactical Air Command and the Military Airlift Command, and overseas in Europe and the Pacific.

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CHAPTER I

INTRODUCTION

Man has always been fascinated with the future. Since civilization began, he has tried to look forward in time by using tea leaves, chicken bones, dice, and virtually anything else available that he believed may give him an edge over his environment.(22:1) In the late 1700's, Marie Jean Antoine Nicholas Caritat, Marquis de Condorcet, introduced scientific methods to the mysticism of predicting the future.(22:1) Since that time futurologists have developed some 150 methods to forecast the future, and forecasting techniques are taught in over 200 college and university courses in the United States.(152:22; 185:--)

What attracts man to the future? The answer is timeless. If one can know what will happen in the future, then he can try to avoid the bad, take advantage of the good, and maybe alter some things to his advantage along the way. The American management guru Peter Drucker puts it this way: "Decisions exist only in the present. . . . The question is . . . not what we should do tomorrow. It is: What do we have to do today to get ready for tomorrow?"(66:8-9)

The Air Force's Air University (AU) understands the need to look into the future. AU has one of the few Air Force regulations establishing a formal long-range planning process that is not explicitly part of the Planning, Programming, and Budgeting System (PPBS).(8:--). As part of the AU process, the regulation requires all subordinate organizations to develop a ten-year long-range plan.[8:3a(5)] The model distributed to AU units as a suggestion on how to develop those plans includes the need to determine and evaluate the future environment.(87:2) As part of AU, the Air War College (AWC) must develop a long-range plan to comply with AU guidance.

The purpose of this study is to provide credible and relevant insight into the future for AWC leadership to use in strategic and long-range planning, and, ultimately, to strengthen decisions they make today. The study analyzes and assesses available information about AWC's future environment, presents it in a format usable to AWC leadership, suggests implications of the probable future for AWC and presents strategic issues that AWC decision makers should address for AWC to be more effective in the future.

Chapters II through V explain the study methodology, analyze the fundamental purpose of AWC, and determine topics and time periods for forecast research. Chapters VI through XIII contain the forecast research and an analysis of the data as it pertains to AWC. The last chapter recommends strategic

issues that AWC leadership should consider for action today to improve its operations in the future.

The next chapter describes the methodology and assumptions used throughout the study. Addressing the methodology collectively at the beginning makes later chapters more concise and focused.

CHAPTER 11

METHODOLOGY AND ASSUMPTIONS FOR AIR WAR COLLEGE FORECASTING

Objectives

There are many approaches to forecasting. However, there are three fundamental objectives that the forecaster must consider, regardless of the methodology selected:

1. First, understand that a forecast is only so much paper unless it is read and used. The decision maker must find the forecast clear, easy to read and comprehend, and convincing. (18:262)

2. Second, keep in mind the purpose of the effort. Forecasting is conducted to improve the quality of decisions made today. (18:39) Therefore, the forecast conclusions must be relevant to the organization. The decision maker must be able to answer the question: "What does this mean to me?"

3. Third, if the decision maker views the forecast as science fiction or pure speculation, the effort will have been in vain. Therefore, future insights must be personally credible to the decision maker. (18:25)

In the final analysis, for a forecasting study to be successful, the decision maker must "assume ownership" of the forecast, and confidently incorporate it as one of many decision-making tools. (180:7) This study uses methodology and techniques that meet that ultimate goal.

Overall Methodology

Forecasting is a process whereby "the analyst must: first, list the interests [of an organization]; second, attempt to weigh those interests; third, evaluate the interests in the specific region and time period of interest; and, fourth, comprehend as well as possible the ways in which the different interests complement and contradict each other." (18:24) Another futurist describes a similar logic process by explaining that the question to answer about the future is: "What futurity do we have to factor into our present thinking and doing, what timespans do we have to consider, and how do we converge them to a simultaneous decision in the present?" (66:8-9)

This study uses the combined philosophy in these two descriptions of the forecasting process. The result is a methodology with the following steps:

1. Determine the purpose of the organization.
2. Select topics for forecast research that will have a significant effect on the organization in the future.
3. Select the appropriate time period in the future on which to focus the research.

4. Conduct research on the topic areas.
5. Analyze the research data to determine implications for the organization.
6. Identify strategic issues the decision makers should address today that will maximize future operations.

The next six sections of this chapter present the specific methodology used in this study for each step in the forecasting process. The next section addresses methodology for determining the purpose of AWC.

Purpose of Air War College

On the surface, the method to determine the purpose of AWC appears easy. AWC has an official mission statement and a list of objectives. However, the mission statement is vague, and the objectives tend to change over time.(25:--) A study of the mission and purpose of organizations that interact with AWC will help identify more clearly those objectives that may be enduring. Further, a review of the AWC curriculum over time may or may not show a disconnect between what AWC claims to be its purpose, and what it actually does. To ensure a thorough understanding of the fundamental purpose of AWC that will be useful throughout this study, chapter III, "The Fundamental Purpose of Air War College," includes an analysis of five areas:

1. Mission and responsibilities of AWC's primary customer, the US Air Force

2. Mission and objectives of AWC's basic parent organization, AU
3. Historical review of AWC's mission statements and objectives
4. Mission and objectives of the other main US war colleges, the Army War College and the Naval War College
5. The 1989 Congressional Report of the Panel on Military Education, the most recent study of officer education

A synthesis of this information shows those elements of AWC's purpose that are enduring, and helps determine topics that should be researched.

Selecting Topics for Research

Choosing the right topics to research is critical to the relevancy and credibility of the forecast. The topics selected should closely relate to the purpose of the organization.(128:18) They should also include parameters which most affect the organization--particularly those anticipated to impact the organization in the future.(18:25)

There must be a relevancy test to determine which topics are most important.(1:77) Understanding the basic purpose of AWC is the first major step. Chapter IV, "Selecting Topics for Research," builds on this foundation.

The methodology in chapter IV merges two sets of information. The first is a literature search of topics that other futures' studies used, including military and civilian studies. The second set of information is a look at AWC

through three separate "lenses," each of which gives a different perspective of AWC.

The first "lens" explains AWC in terms of a generic organization. It applies basic parameters of organization theory to AWC like the main interests of the organization, raw material input, internal processes, and so forth. The second "lens" looks at AWC as an educational institution, particularly a continuing or adult education institution. This area introduces information about students, curriculum, and school operations. The third "lens" looks at the Air Force organization to see how AWC fits. The review is based on principles in the Air Force doctrine manual and the Air Force combat support doctrine manual.

The information developed from these analyses is synthesized into a final list of topics. The next step in the process is to decide the future time period on which to concentrate the research effort.

Future Time Period

There are three essential considerations in determining a future time period for forecast research. First, what are the "life cycle" time frames for the organization? For instance, ships built today may last 30 years. Today's decision to invest in development of a mine or to plant trees for lumber production will not show results for 10-30 years.(18:21) Air Force buildings constructed in the 1950s are still used today.(131:--) "The nature of the

business and the nature of the decision determine the timespans of planning.(104:16) Further, "logic in selecting the right time range for planning . . . [should] lie in the nature of investment of resources of the enterprise."(24:36) In short, selecting the appropriate future timespan must consider the time to plan for, implement, and reap rewards from today's most important decisions.(66:15)

Second, the farther into the future one looks, the less likely it is that the forecast will be accurate. A forecast's accuracy diminishes the farther into the future it looks.(104:30)

Finally, to ensure that the forecast has credibility with the decision maker, the time period must be within his personal "comfort index." That is, the leader must believe that insights about the future are credible. A large part of that credibility lies in how far out the forecast is made. (104:35-36) For example, even if the life cycle of a building is 30 years, will the decision maker have confidence in a forecast that far into the future?

These three considerations lead to an important dilemma for the forecaster--how to merge the different near-term and long-term time thresholds. The study methodology has four steps that attempt to resolve this problem. The first is a literature search of the future time periods used in other studies. The second step is to dissect the topics selected for research and determine the timespans

critical to decisions affecting key elements of each topic. For instance, the time needed to develop a senior officer may be 22-30 years. Third, determine AWC leadership's confidence level for looking into the future by asking several senior AWC decision makers. The final determination of the future timespan is subjective, and considers all of the input from these three steps.

One last comment about determining future time frames is important. Research in this study will not concentrate on a specific future time like the year 2000 or 2010. Rather, the data will be arrayed over time from the present through various stages into the future, with the end point being an approximate year in the future. There are several reasons for this approach. First is the availability of information. In addition, this method allows decision makers who may be skeptical of long-term implications in a specific area to retreat to a more near-term time where their confidence level may be better. It also increases the decision makers' confidence in the forecast by showing the future as an evolutionary process, rather than a revolutionary one where the forecast jumps abruptly to a far-off future time in one leap. Finally, forecasts that reach beyond the specific time period selected are still valuable because they show the direction of trends.

Topic Research Methodology

There are over 150 forecasting methods.(152:22)

Generally they fall into two categories. The first is topic specific. These techniques manipulate raw data or use experts with years of experience to conduct analysis in a specific area, like population growth, or economic trends in the United States. Regression analysis, interpolation, and similar methods fall into this category. The second category involves a "blending together" of methods and conclusions to determine future insights across a number of topic areas. Techniques that fall in this category include scenario writing, alternative futures, and combined sources forecasting(180:3-7; 152:23-40).

This study requires insight into a number of topic areas, so the first category of methods is not practical. The method selected for this study comes from the second group of techniques, and is the "combined sources methodology."

This method draws on the already developed forecasts of experts in a variety of fields. That lends credibility to the forecast. Further, the data is normally presented in easy to digest fashion, so the forecaster and the decision maker can easily understand its significance. Finally, this approach permits the decision maker to develop alternate mixes of possible futures by applying different insights and different weights to each data-element presented. In this way, the study becomes a "living forecast," because it can be

updated easily, and is not tied to either the interpretation of the study's author or any particular decision maker.

There are drawbacks to this method, however. The two most important ones are that the data often are quite general, and specific details that may be important could be hidden. This is the tradeoff between being inundated with masses of data, and the need to present data in a usable form to the decision maker. The second drawback is that experts often disagree. Therefore, care must be taken when selecting information for the forecast, and in deciding whether to include one expert's opinion over another, or to include them both.(180:3-7; 152:23-40)

The specific technique for conducting research using the combined sources approach will be to research periodicals, books, studies, and reports on the topics selected; and use the most recent data available, generally not over five or six years old. The research effort includes gathering multiple sources for key predictions, wherever possible. While this does not preclude the possibility that the first source may have drawn data from the second, multiple sourcing does add credibility to the forecast. Where significant divergent opinions are found, they will be presented as such. Including differing opinions does not weaken the value of the information. It simply means that decision makers must be careful when using this information in decision making.

Chapters VI to XII are written in a particular style that makes the material easy to reference and credible. Each major trend or forecast is underlined. The narrative following each forecast contains examples and other information to substantiate the forecast. Often, multiple references appear. This technique gives the reader instant understanding that the information is believed by several sources, and therefore adds to its credibility.

Implications of Future Insights for Air War College

The research analysis in chapters VI through XII occurs by topic area (technology, demographics, military budget, etc). The implications analysis presented in chapter XIII blends these future insights across topic lines and puts them together so the result is meaningful to AWC leadership.

This is done by depicting the probable future AWC students, the AWC operation, and the future Air Force. These three areas are fundamental elements of the organizational model introduced in chapter IV. This analysis is the basis for developing strategic issues that AWC leadership should consider for action today.

Strategic Issues for Air War College

The last chapter recommends strategic issues for consideration by AWC leadership. The recommendations are based on all information presented throughout the study.

Assumptions and Limitations

This study addresses only resident AWC professional military education (PME). Further, it focuses on the education of Air Force officers who attend AWC in residence. The study makes several assumptions. First, there will be no catastrophic global or national event during the forecast period. Second, the federal laws governing Air Force responsibilities will not change. Third, although selection criteria for attendance at AWC may differ from that used for in-residence attendance at Air Command and Staff College (ACSC), parameters representative of students attending ACSC are reasonably good indicators of future AWC students. Fourth, AWC class size will not change appreciably during the forecast period. Finally, AWC students generally reflect the values, expectations, and behavior of US society.

The next chapter investigates the fundamental purpose of AWC. The purpose of AWC is important in determining topics to research, and helps keep the entire study effort focused.

CHAPTER III

THE FUNDAMENTAL PURPOSE OF AIR WAR COLLEGE

The starting point in developing a relevant and meaningful forecast is to determine an organization's mission and objectives.(128:18) The AWC mission statement is broad and vague.(136:187) A forecaster needs a more indepth analysis.

This means investigating five areas: first, the mission and responsibilities of the primary customer of AWC, the US Air Force; second, the mission and objectives of AWC's primary parent organization, Air University; third, the mission and objectives of AWC; fourth, the missions and objectives of the other two primary US military senior service schools, the Army War College and the Naval War College; and finally, a look at the most recent study of PME, the 1989 Congressional Report of the Panel on Military Education. An analysis of these five areas will show the fundamental elements of the AWC mission and objectives.

Note that this analysis is not designed to rewrite or validate the existing AWC mission statement or any current official objectives. It is designed to provide a base line

reference of what is most important to AWC, by looking from the past, through today, to gain insight into the future. The forecaster needs this insight to help determine what topics to research. It also keeps the entire forecast effort focused on those considerations relevant to the organization.

The Air Force Mission

The mission of the Air Force is clearly articulated in US Code, Title 10, Section 8062, Armed Forces: "It is the intent of Congress to provide an Air Force that is capable, in conjunction with other armed forces, of preserving the peace and security, and providing for the defense of the United States, the [t]erritories, [c]ommonwealths, and possessions, and any areas occupied by the United States; supporting the national policies; implementing the national objectives; and overcoming any nations responsible for aggressive acts that imperil the peace and security of the United States." (20:1-1)

The National Security Act of 1947 specifically dictated that the Air Force "shall be organized, trained, and equipped to perform prompt and sustained offensive and defensive air operations." (20:3-1)

An analysis of these laws shows their significant parts:

1. Conduct joint operations with other US and allied military services.
2. Take actions short of conflict to maintain peace.
3. Take effective military action where required.

4. Support national policies and objectives.

5. Integrate aerospace forces with other instruments of national power.

6. Conduct offensive and defensive operations.

With these six elements of the Air Force mission clearly articulated, and assumed to be inviolate for the forecast period (see chapter II), the investigation now focuses on the next level of command, Air University.

Air University

The mission of AU as it pertains to PME is stated in the May 1988 document, Air University Planning Guidance, Goals, Challenges, and Philosophy: "The mission of Air University is to improve the warfighting capability of the Air Force through professional education." (140:1) This planning guidance also lists numerous objectives. Those that deal directly with PME are:

1. "Educate as a total, joint force, with allied nation responsibilities."

2. "Teach Air Force members the value of strategic planning, decentralized management, and the value of physical and mental wellness."

3. "Focus curricula on warfighting."

4. "Incorporate 'space operations' into warfighting curricula."

5. "Emphasize doctrine education."

6. "Teach AF members to use and effectively manage AF technology."(140:10-12)

The Airpower Research Institute Center for Aerospace Doctrine Research and Education (CADRE) provides the most comprehensive historical documentation on the evolution of Air Force officer PME. Their 1988 study concluded that the early historical requirements in the 1940s for officer PME included educating and training them to:

1. Think.
2. Lead.
3. Solve problems.
4. Plan and prepare for future events.
5. Express themselves clearly.
6. Develop judgment, initiative, and resourcefulness.

(25:1-6)

The first official AU charter was published in 1946, and has been revised and expanded over time. That first charter stated that AU was responsible "to ensure a progressive system, that all essential fields of education and training are included."(25:2-2) A 1950 version added that AU was to "prepare officers for command of large Air Force units . . . and for staff duties."(25:2-2) That mission was expanded in 1959 to include duties not only in large units, but "in all types of Air Force organizations."(25:2-3) The addition of a responsibility to prepare officers for "joint and combined commands" was added in 1963.(25:2-3) The 1985

version was more general, and charged AU with conducting "education programs to meet Air Force professional military . . . educational requirements." Further, one AU objective in 1985 was to "prepare commissioned . . . officers . . . for command, staff, leadership, and management responsibilities." (25:2-4)

A common attribute in all of these mission statements is that each is quite broad and general. This situation led to several PME studies that tried to more clearly articulate the purpose and objectives of PME. For instance, a 1946 review board looked at PME for the Army. As part of the Army, the Air Force contributed three "educational themes" it believed appropriate for PME. First, "provide officers with the necessary narrow technical specialization to do their jobs." Second, "educate officers to think and perceive the broad context of national security issues." Third, "foster perpetual forward thinking unhampered by tradition." (25:4-1)

In a 1961 study, HQ USAF/PTR appointed a board to look at Air Force PME needs. One result was an official definition of an Air Force officer:

The professional Air Force officer is an expert in the profession of arms, particularly as pertains to aerospace power. He understands the nature of war and is proficient in the art of waging it under any condition. He is a leader of men in peace and war, and he is

accomplished in utilizing his knowledge and skills in organizing and managing resources.(25:4-3, 4-4)

In 1966, the Air Force published the landmark document, AFM 53-1, USAF Officer Professional Military Education System.(25:2-5) This manual explains that PME "is the systematic acquisition of theoretical and applied knowledge . . . [relating] . . . to the profession of arms." It involves acquiring "knowledge, . . . skills and attitudes, . . . principles, concepts, ideas, and . . . applications [about] officership, . . . public stewardship, . . . military art and science, . . . national goals and objectives, [and] . . . utilizing military force." It also explains that students should be challenged to think creatively, to solve problems, and to improve leadership and communicative skills.(25:2-7,2-8) A detailed summary of excerpts from this important regulation is found in figure 1. The manual also included specific topics to be taught by PME programs:

1. War: its nature, causes, tactics and strategies
2. Force structure: how they are developed, sustained, and employed throughout the spectrum of conflict (especially aerospace forces)
3. National security policy: political, economic, technological, and psychological factors
4. Leadership and management

1. PME "is the systematic acquisition of theoretical and applied knowledge . . . [relating] . . . to the profession of arms.

2. PME involves acquiring "knowledge, skills and attitudes . . . which form the core of understanding which must be common to all officers."

3. PME "is primarily the study of officership, . . . public stewardship, and of the military arts and sciences of command staff expertise in peace and war."

4. The officer must "[understand] national goals and objectives, and the ways and means of utilizing military force to achieve them."

5. PME is designed "for all officers, whatever their specialties, their grades, or the duration of their commitment to the Air Force."

6. "Each level of [PME] should provide the . . . knowledge, understanding, attitudes, and skills needed . . . in the next several years after graduation. Certain fundamentals are applicable to an entire career."

7. "[PME] should be conducted in an atmosphere of . . . individual inquiry, critical thinking, and of research relative to the nation's military affairs. . . . Students should be challenged to the utmost of their abilities. . . . [They should have] programs that increase their ability to think creatively, solve military problems in a logical and systematic manner, . . . stimulate development of leadership attributes . . . and . . . make clear and meaningful oral and written presentations."

8. "[PME] should concern itself with principles, concepts, ideas, and with applications." (25:2-7,2-8)

Figure 1: Significant Excerpts from Air Force Manual 53-1, USAF Officer Professional Military Education System

5. Military organization, mission, and doctrine (especially aerospace), and how they are employed to include joint and combined operations

6. Military doctrine, strategies, tactics, organizations, capabilities, and limits of allied and potential enemy nations(25:2-8)

One of the most recent reviews, a 1976 study by HQ USAF/DP entitled Report of a Study on Officer PME Policy, defined PME as "the acquisition of theoretical and applied knowledge of the profession of arms, including the knowledge, skills, and attitudes requisite to military professionalism which form the core of understanding common to all officers." (25:5-2)

The features of AU's mission and objectives that appear repeatedly over time are shown in figure 2. This analysis adds significantly to the understanding of AWC's fundamental mission. The next section analyzes the actual AWC mission and objectives.

Air War College

The 1989 mission statement for AWC reads that the school's purpose is "to prepare senior military officers to develop, support, and lead the aerospace component of national power to deter conflict and achieve victory in the event of war."(14:6) The mission statements of AWC from 1946 to the present changed little over time. To illustrate, AWC mission statements for selected years are shown below:

Mental and Physical Skills

- Leadership
- Command
- Management
- Critical, independent thinking
- Problem solving
- Reading and writing
- Strategic planning
- Professional military attitudes
- Mental and physical wellbeing

Art and Science of War

- Warfighting
- Doctrine
- Organization
- Mission
- Force structure
- Technology
- Space
- Total force (joint/combined)
- Future environment

National Security Policy

- Factors influencing
- Development
- Implementation

Figure 2: Historical Analysis of the Areas of Importance to Air University over Time

1. 1946: "[T]o prepare officers for duty with large AF units, and to promote sound concepts on broad aspects of airpower." (25:3-6)

2. 1958: "Consideration of broad aspects of airpower by selected officers to determine [the] most effective development and employment of [the] AF as a whole, and to prepare these officers to command and employ large AF units." (25:3-7)

3. 1965: "To prepare senior officers for high command and staff duty by developing in them a sound understanding of military strategy in support of national security policy to ensure an intelligent contribution towards the most effective development and employment of aerospace power." (25:3-9)

4. 1978: "To prepare select officers for key command and staff assignment where they will be tasked with responsibility for developing, managing, and employing airpower as a component of national security." (25:3-13)

5. 1988: "To prepare senior military officers to develop, maintain, and lead the aerospace component of national power to deter conflict and achieve victory in the event of war." (11:para 2)

The officially stated AWC objectives for PME and the AWC curriculum provide additional insight into the AWC philosophy on what the school should do. Figure 3 lists the school's official objectives in 1948, 1976, and those

Objectives are abbreviated in this figure, but are shown in the order listed in the directive published for the year shown.

1948. Teach the officer to:

1. Improve breadth and scope of thinking and problem solving for "any problem, be it military or any other."
 2. Develop a "capacity" to solve "a military problem with facility, clarity, and competence."
 3. Improve the ability to analyze and appraise military doctrine.
 4. Prepare students to "project his ideas, recommendations, and solutions effectively and convincingly."
 5. "Obtain sound solutions to current problems."
- (10:para 3)

1976. Teach the officer:

1. Formulation and implementation of US objectives, security policies, and strategy."
2. The US security threat.
3. "Critical domestic issues . . . and their influence on national policy."
4. "Allocation and management of defense resources."
5. Military science and technology.
6. Decision making.
7. "Aerospace doctrine and concepts."
8. "Employment doctrines of other US military forces."
9. "Current and future military capabilities, limitations, and strategic options of the United States, its allies, and potential adversaries."
10. To "articulate Air Force positions and apply aerospace power." (174:para5-3)

Figure 3: Historical List of Air War College Formal Objectives

1986. Teach the officer:

1. "Current and future threats . . . and concepts and capabilities . . . to counter those threats."
2. "National and military strategies through the study of history . . . and [to] formulate and evaluate [appropriate military strategies] for current and anticipated needs."
3. "The roles and limitations of air power . . . [and] the . . . spectrum of conflict."
4. The evolution of military doctrine of the US and the Soviet Union.
5. Formulation and implementation of US national security policy.
6. The "contemporary international and national security environments."
7. "Values, attitudes, and ethic[s]."
8. "Command, leadership, and management."(175:5-3)

Figure 3: Historical List of Air War College Formal Objectives (continued)

published in 1986. Figure 4 shows the curriculum for selected school years.

An analysis of the AWC mission statements over time, the objectives of the school, and the actual curriculum taught provide a number of enduring themes. Those themes are shown in Figure 5.

Army and Naval War Colleges

A review of the Army and Naval War Colleges shows similar missions and objectives to those seen for AWC. The Army War College's mission as it relates to PME is to "provide the Army and the nation senior leaders prepared to operate in a strategic environment." (176:1) This current mission is further explained by referring to the origins of the school where the Secretary of War and founder of the Army War College, Elihu Root said of it in 1903: "[Its purpose is to] study and confer on the three great problems of national defense, military science, and responsible command." (176:1) The US Army War College Action Plan further expands on the school's objectives by stating that the school should give officers "professional knowledge and understanding . . . [and improve] creative, critical, and analytical thinking and communication capacities." (176:3) The plan continues by stating that the Army War College should produce officers that can operate effectively regarding national security policy, the profession of arms, and the application of these skills in leadership and management positions. (176:4)

- 1946-47: Communication
 - Problem solving
 - Intelligence
 - Management
 - Training
 - Logistics
 - Historical analysis
 - Operations
 - Science, technology, weapons
 - Future (25:3-6)
- 1952-53: International conflict
 - Air warfare (theory, weapons, offense, defense, theater operations)
 - Global strategy (current and future)(25:3-7)
- 1961-62: International relations (basis and current)
 - National security policy (formulation; influence of science, technology, and weapons systems)
 - Military and national strategy (military and future national strategy)(25:3-8)
- 1966-67: National power
 - Theory of war
 - US national security policy
 - AF and DOD decision making
 - Military threat
 - Military capabilities and employment (DOD, research and development, unified and specified commands)
 - Military strategy and air power (concepts, science and technology, alternatives, space, future)(25:3-10)

Figure 4: Historical List of Curriculum for Selected Air War College School Years

- 1971-72: National power and policy
 (psychosocial, political, military,
 economic and technical, threats,
 formulation)
 Defense resources management
 Nature of war and military forces
 (historical, current, future)
 Strategic concepts, commands, areas
 Spectrum of conflict
 National security problems (issues and
 alternatives, future)(58:3-11)
- 1977-78: "The curriculum is focused on
 international and national environment,
 command and management problems of
 national security, and military
 capabilities and strategy with emphasis
 on the application of aerospace
 power."(174:para 5-1)
- Leadership, management, and
 decision making
 Resource management
 National security affairs (US and world
 affairs, policy formulation, media)
 Military strategy and capabilities
 (threat, doctrine, strategy, strategic
 forces)
 Military employment (general purpose
 forces, mobility and readiness,
 theater employment)(25:3-12)
- 1982-83: Military employment (strategy, Soviet
 studies, general purpose forces, joint
 and combined warfare, strategic forces
 and space)
 National security affairs (environment,
 policy studies, regional studies)
 Leadership and management
 (decision making, AF personnel
 resource allocation)(25:3-14)

Figure 4: Historical List of Curriculum for Selected
 Air War College School Years (continued)

1986-87: "The curriculum stresses the application of aerospace power . . . [with] a major part . . . devoted to . . . current strategy . . . [and] future strategies." (175:para 5-1)

Aerospace doctrine and strategy
 (military strategy, general purpose
 forces, strategic forces, space)
National security affairs (policy,
 Soviet studies, regional issues)
Command and leadership(25:3-15)

Figure 4: Historical List of Curriculum for Selected Air War School Years (continued)

Mental and Physical

- Leadership
- Command
- Management
- Officership
- Thinking
- Problem solving
- Analysis and appraisal
- Reading and writing

Art and Science of War

- Warfighting--history and theory
- Doctrine
- Threat
- Technology
- Future war preparation
- Capabilities and limitations of military power (especially air powers)
- Options for using military force (especially air power)
- Roles and missions
- Employment
- Military strategy
- Development and maintenance of the force
- Spectrum of conflict
- Space

National Security Policy

- Objectives
- Domestic issues
- International issues
- National strategy

Figure 5: Summary Analysis of the Air War College
Mission and Objectives

The 1988-89 Army War College curriculum reflects these objectives and contains course material that is very similar in subject matter to the AWC curriculum for the same academic year.(25:7-8)

The Naval War College's PME mission is similar to that of its sister services: "To enhance the professional capabilities of its students to make sound decisions in both command and management positions."(25:7-18) The founder of the college was the 1884 Secretary of the Navy, William E. Chandler. Secretary Chandler created the school as "a place of original research on all questions relating to war and the statesmanship connected with war, or the prevention of war."(25:7-14) As with the Army War College, the 1987-88 Naval War College curriculum is similar to that of the AWC for a similar period.(25:7-20 to 7-23)

1989 Report of the Panel on Military Education

A review of this report is particularly important because the Air Force is today in the process of responding to the study recommendations. The report will likely have a significant impact on operation of the AWC in the immediate future.

The report studied officer PME at the intermediate and senior grade levels. The panel participants believed "that PME schools should concentrate on the one subject that only they can teach--the use of the military to attain specified national objectives."(136:178) Further, PME should teach

warfighting; and knowledge of the student's service, other services, and the joint system.(136:178)

Other comments about PME include the following:

1. "The central focus of the schools should be . . . force employment . . . and force development." (136:179)

2. Schools should reduce the time devoted to subjects not directly tied to this central focus, such as executive skills and management, foreign policy and foreign area orientation, writing, and leadership.(136:179)

3. Officers should learn how to analyze, creatively solve problems, and have an attitude that encourages "critical examination."(136:29)

4. Officers should "become skilled in the application of strategy." [Schools] should include "the development of military capabilities that would be effective in preserving peace, during a war, and in an intermediate range of crises situations."(136:26,28)

5. Majors should concentrate on broadening knowledge about their own service, and learning missions and capabilities of the other services. This includes areas of study such as capabilities, limitations, weapons system technologies, organization, doctrine for tactical and theater employment through the spectrum of conflict, command and control systems, joint operations from the member's service perspective, and theater employment of joint forces. This

level of education in service schools should be the primary one for learning jointness.(136:8, 61)

6. War colleges should concentrate on national military strategy which is "the art and science of employing the armed forces of a nation to secure the objectives of national policy by the application of force or the threat of violence."(136:26)

7. General officers should receive education on national security strategy.(136:102-103)

8. The 10 PME schools in the Department of Defense should have specific responsibilities in the overall scheme of officer education that works in a building block fashion. without unintentional duplication.(136:21)

The report also lists those subjects that service PME schools should teach on joint matters. This list includes the integrated employment of forces; national military strategy; strategic, contingency, and theater campaign planning; combat command and control under a unified command; and joint doctrine, force development, operations, logistics, communications activities and intelligence.(136:60-61)

This recent study includes three recommendations of significance. First, PME schools should educate officers in a building block approach by adding to the knowledge base through successive schooling. Second, some of the schools should be restructured to become joint education centers for the military. Third, schools should restructure the emphasis

among subjects with concentration on force employment.

(136:2-8) The implication for AWC is a need to more closely connect AWC objectives with objectives of other schools, and review curriculum to emphasize the recommended subjects.

Conclusion

The Air Force, AU and AWC missions and objectives are tied together functionally and organizationally. There are common threads that run through all of the mission statements and historical data related to responsibilities of the Air Force, AU and AWC.

This evidence supports the following statement of purpose for AWC: Instill in lieutenant colonels and colonels the knowledge they need to make and contribute to future complex and strategic senior-level military and national security decisions related to development and execution of military and national strategies in time of peace, heightened tension, and war, by teaching the theory, principles and concepts, developmental processes, and application techniques integral to making those decisions.

Historical evidence also indicates that, over time, the subjects that should be taught (and, therefore, can be objectives of instruction) do not change significantly. However, the comparative weight given to the subjects varies considerably over the years. It is significant that the single area most mentioned over time as a responsibility of military senior service schools is not how to understand or

wage war--it is to teach senior officers how to make sound decisions. The subject areas that appear enduring over time are shown below. Note that the 1989 Congressional Report of the Panel on Military Education suggested a focus on the first two:

1. Past, present and future theory, doctrine, technology, and national military strategy associated with armed conflict (especially of the aerospace forces)
2. Obtaining, preparing and employing aerospace forces in conjunction with joint and combined forces
3. National policy making and national security processes and their implementation
4. National and international affairs
5. Leadership, management, and decision making

Insights into the mission and objectives of the organization are basic first steps in the forecasting process. The next chapter deals with determining which areas of the future are most important for AWC. The conclusions reached in this chapter about AWC's mission and objectives are an integral part of that discussion.

CHAPTER IV

SELECTING TOPICS FOR RESEARCH

Review of Military and Nonmilitary Forecast Studies, Books, Articles, and Long Range Plans

Reviewing the work of other forecasters gives a base line from which to determine appropriate topics to research for this AWC forecast. A 1989 study by the University of New Mexico's Readiness Technical Advisory Group (RTAG) for Air Force Engineering and Services analyzed 36 forecasts; long range plans; and futures studies, reports, and briefings. The analysis determined which subjects military organizations usually selected for forecast research.(77:--) The results are shown in figure 6.

A separate analysis of 10 military and 15 nonmilitary studies, books, briefings, reports, and articles dealing with the future or long-range planning came to similar conclusions. This second analysis includes military sources, nonmilitary sources, and sources containing forecast subjects specifically directed at education and training. The results of that analysis are shown in figures 7, 8, and 9.

	World Conditions & Threat	Continued Regional Tension	Terrorism, LIC	Arms Control, INF	Air Base Operability	Force Projection	Joint/Combined Operability	Combat Supportability (R&M)	Baseing Beddown	Organizational Issues	Financial Constraints	Construction Trends	Personnel/Training	Manpower	Health Issues	Space	Energy	Environment	Technology	Computers	C2	Sensor/AI/Robotics	Productivity
SAC 2000 and Beyond	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
2025 Innovation Task Force	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
AF Logistics Concepts of Operations	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
AFMED 85 Concept of the Future	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
R&M 2000	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
AF Academy Case for Long Range Planning	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Alternative Futures--Security Police 21st Century	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Logistics 2010 Strategies for the Future (DOD)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Conflict Year 2000: Challenges for Military Reform	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Alternative World Scenarios (Army War College)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Army Corps of Engineers Strategic Workshop	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Army Global Trends/21st Century Implications	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Army Science Board: Lightening the Force	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

Figure 8: RTAG's Analysis of Forecast Documents (Cont'd)

Figure 8: RTAG's Analysis of Forecast Documents

Unconventional Warfare		World Conditions & Threat	Continued Regional Tension	Terrorism, LIC	Arms Control, INF	Air Base Operability	Force Projection	Joint/Combined Operability	Combat Supportability (R&M)	Basing Beddown	Organizational Issues	Planned Constraints	Construction Trends	Personnel/Training	Manpower	Health Issues	Space	Energy	Environment	Technology	Computers	C2	Sensor/AI/Robotics	Productivity
Evolution of Maritime Battlefields		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Resources, Technology, and Future Battlefields		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Battlefield Space		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
HQ USAF/XOXFP Briefing		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
HQ USAF/DP Personnel Strategic Guide		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
HQ USAFE/XPXF Briefing		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
SAF/AC Comptroller Briefing		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
HQ USAF/SC Briefing		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
HQ AFSC Space Division Long Range Plan		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
HQ USAF/PR Programs/Resources Briefing		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
SAF/AQ Acquisition/Development Briefing		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

Figure B: RTAG's Analysis of Forecast Documents (cont'd)

~~SECRET~~
USAF Personnel Study, Now to 2000(163:--)

AF Science & Tech &
Develop Ping Program(5:--)

Army Long Range Plng Guide(17:--)

Logistics Strat Plng Guide(173:--)

USAF Engng & Serv Future Vision(79:--)

Palace Agenda-AF Strat Plan
for Civ Personnel(135:--)

Destination 2003-A Global Assess(117:--)

AF Futures: Probabilities,
Scenarios, & Indicators(33:--)

Army's Long Range Personnel
Plng Briefing(110:--)

Challenges, Opportunities, &
Natl Sec Strategy, USAF/XOXWP(48:--)

Figure 7: Analysis of Military Forecast Documents

42 NONMILITARY

Forecast 2000(80:--)

	Demographics	Students	Faculty	Lifestyle/Values/Behavior	Work Environment/Qualities	Message/Lead/Organization	Teaching Process	Budget/Finances	School/Business Partners	Technology-Educational	Training/Education/Knowledge	Labor Force/Employment	Economy	Technology-General	Technology-Information/Comm	Technology-Space	Technology-Robotics	Technology-Computers/AI	Technology-Weapons	Transportation	Geopolitics-World/Domestic	Threats to US Security	War/Conflict	Weapons Systems/Forces	Arms Control	Environment
Introduction to the Future(152:--)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
America in Perspective(87:--)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Toward 2002, The Bureauorot(37:--)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Megatrends(124:--)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
July 20, 2018(53:--)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
The Future & You(87:--)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Into the 21st Century(47:--)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Management of the US Government(112:--)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
The 21st Century Family(128:--)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

Figure 8: Analysis of Nonmilitary Forecast Documents

EDUCATION DOCUMENTS

	Demographics	Students	Faculty	Literacy/Values/Behavior	Work Environ/Facilities	Manage/Lead/Organization	Teaching Process	Budget/Finances	School/Business Partners	Technology-Educational	Training/Education/Knowledge	Labor Force/Employment	Economy	Technology-General	Technology-Information/Comm	Technology-Space	Technology-Robotics	Technology-Computers/AI	Technology-Weapons	Transportation	Geopolitics-World/Domestic	Threats to US Security	War/Conflict	Weapons Systems/Forces	Arms Control	Environment
Schools of the Future(48:--)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Commanders Ping Guidance (ATC)(55:--)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Long Range Ping for Management(67:--)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Facing Issues Toward the 21st Century(71:--)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Continuing Education in the Year 2000(35:--)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

Figure 9: Analysis of Education Forecast Documents

Figure 10 contains the synthesis of all 61 sources, and shows the most common subjects selected for forecast study. The conclusions drawn from this research will be integrated with those found in the following three sections of this chapter. Those sections present characteristics of generic organizations, educational organizations, and the Air Force organization to discover relationships applicable to an AWC forecast.

Characteristics of a Generic Organization

A close look at the dynamics and parameters of generic organizations gives valuable information about what subjects may be important to AWC's future. Organizations are social entities that have goals, a specific system of activity, and specific boundaries.(61:5) Air War College is an organization according to Air Force definition.(134:--) A model of an organization is shown in figure 11, and includes inputs, outputs, processes, and the external environment.(45:52) Figure 12 shows the components listed in figure 10, but they are formatted using the organizational model presented in figure 11.

Inputs come from the environment into the organization, are processed, and then move back into the environment. The "process" is what transforms input into output and is "the creation of value through work and technology" that is accomplished within the organization. (161:130; 61:130)

Information
People
Equipment and its technology
Facilities
Work environment
Controls/policies
Internal management/organization/
 leadership
Application of effort to add value
 to input
Geopolitics and world order/tensions
Financial constraints
Political and community influences
Lifestyle/culture
Labor force
Environmental issues
Technology
Nature of conflict
Products
Services
Missions

Figure 10: Summary Analysis of 61 Forecast Documents to
Determine Most Frequently Selected Topics

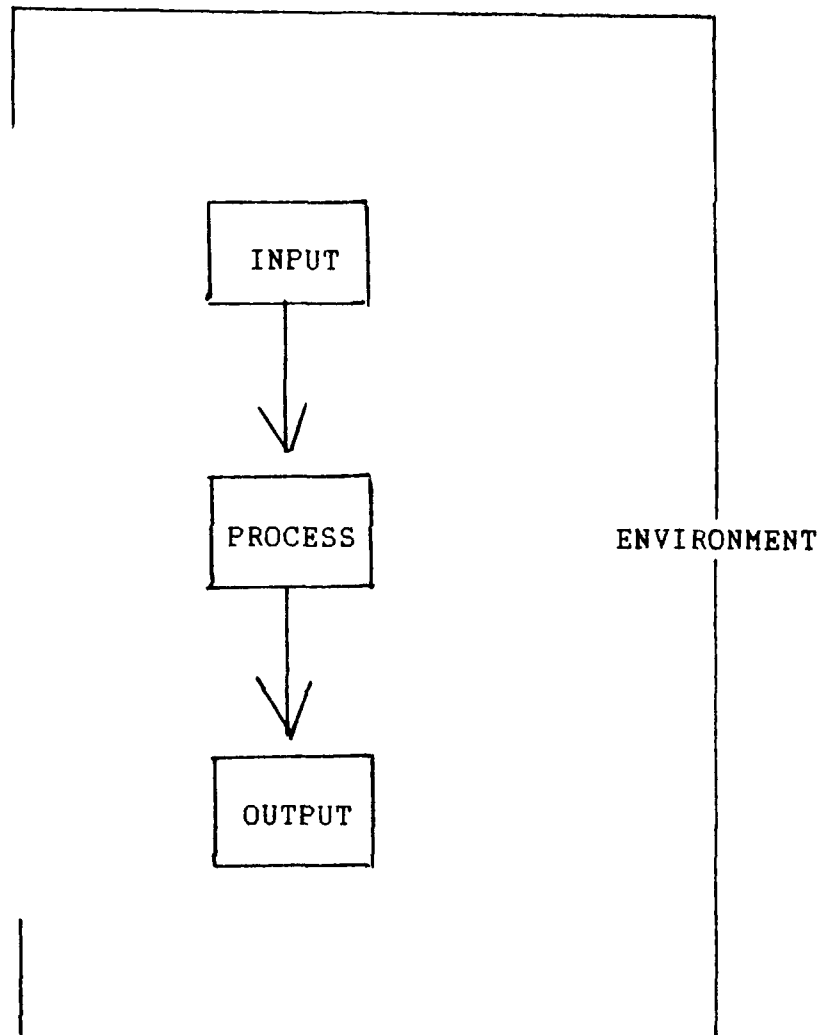


Figure 11: Organizational Model

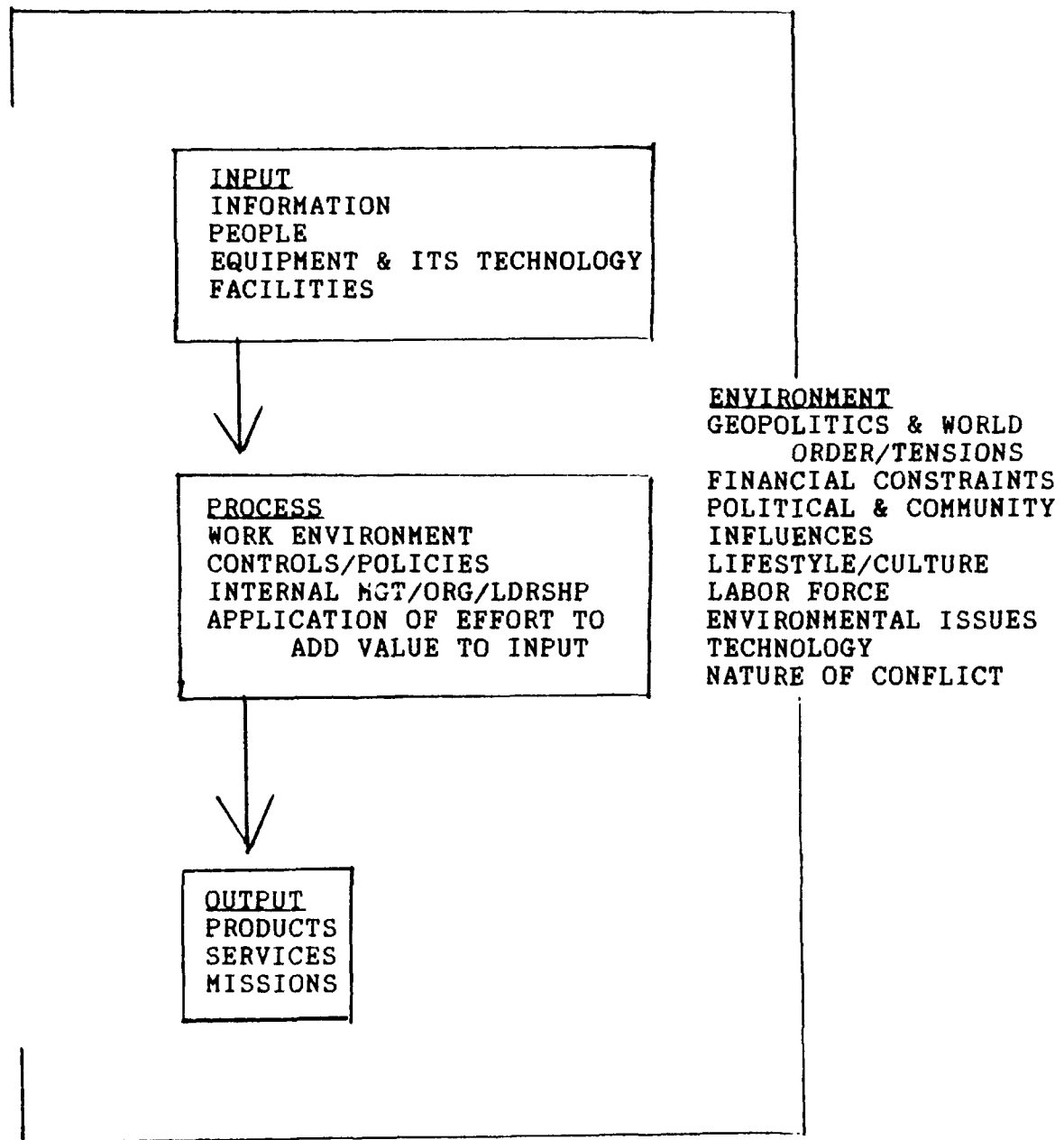


Figure 12: Summary Analysis of 61 Forecast Documents to Determine Most Frequently Selected Forecast Topics Arranged in Organizational Model Format

Also significant is that organizations are "open systems." That is, they are a collection of "interdependent parts functioning as a whole for some purpose, . . . which constantly reacts to its environment."(45:39) Therefore, there may be both internal and external parameters that affect the organization. This relationship is shown in figures 11 and 12 by the environment surrounding the organizational interworkings.

The specific resources and activities that fit into the input, output, process, and environment features of the model vary among management and organization experts. There are commonalities, however. Those commonalities indicate the most important aspects of organizations.

For "inputs", the common components are: information, people, energy, supplies and equipment, and physical plant. For "processes" the components are: management, formal and informal organization structure, power and politics, innovation, technology, and group dynamics. "Outputs" are products, services, and ideas. Common environmental elements include: the economy, government and politics, finances, culture and demographics, technology, natural resources, competition, and the entities that provide inputs and those that receive outputs.(45:42, 260; 61:13, 58, 218-220, 292; 161:130, 133)

Figure 13 summarizes these generally accepted components of a generic organization. To better understand

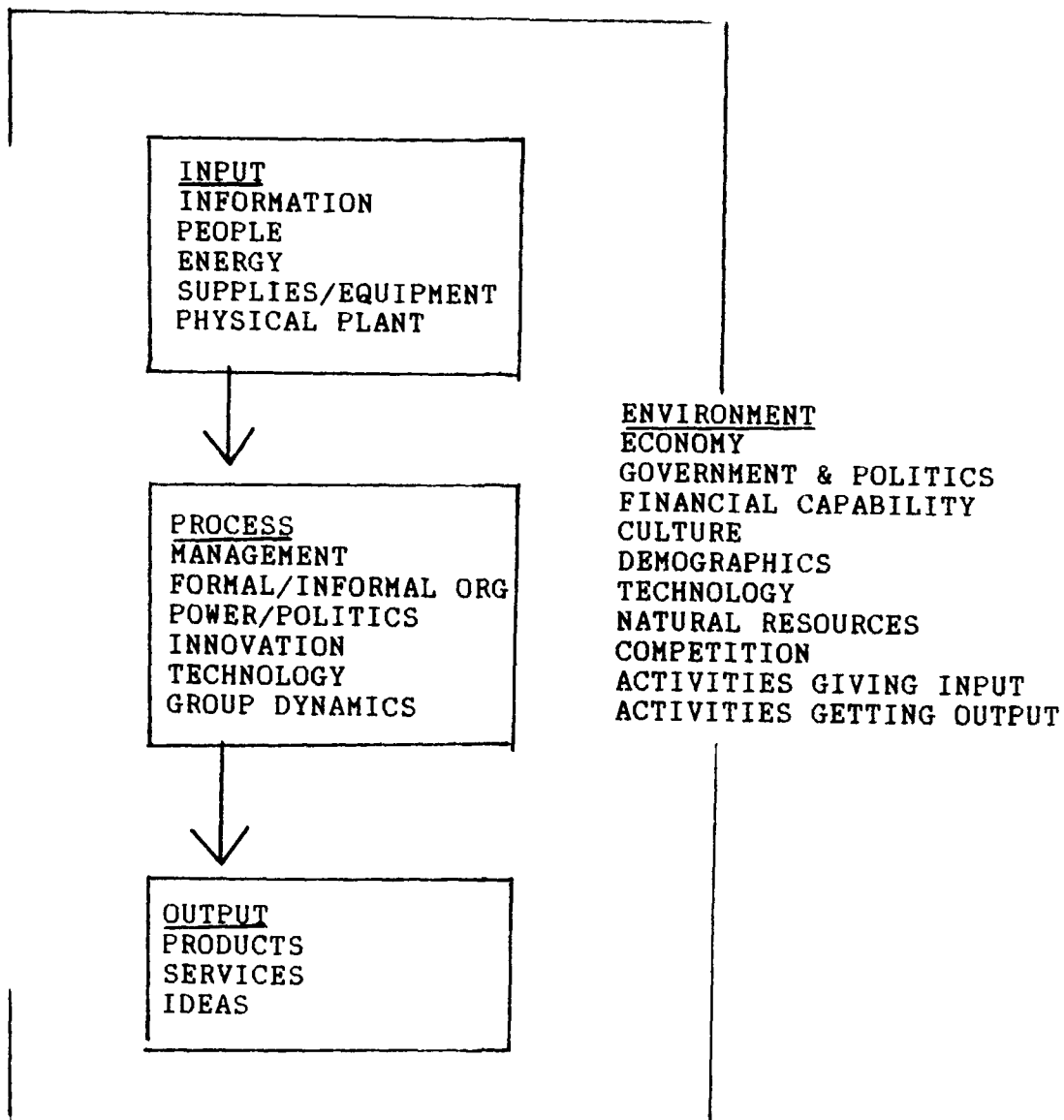


Figure 13: Components of a Generic Organization

how those attributes apply to AWC, attention moves next to the special character of educational institutions.

Characteristics of an Educational Institution

Educational systems are designed to "receive [students] from the environment, transform them in some way, and then return them to the environment." (27:33) The primary input and output of the AWC educational system is the lieutenant colonel and colonel student. (175:7)

A review of several educational texts show organizational elements common to educational institutions. Besides students, input includes buildings, equipment and supplies, and the faculty and support staffs. The primary educational process components are the curriculum and the schedule used to pace student learning and to apportion time to emphasize one subject area over another. Also important is management and leadership, as well as the teaching methodology (lecture, case study, research, etc.). In addition, there is the work environment made up of the formal and informal organization of the school and the dynamics of how the two operate. (147:ix-x; 19:vii-xi; 144:vii-xvi; 41:ix-xvii; 29:39, 52, 75, 84, 143; 48:i)

The environment that affects educational organizations includes the government through regulation, the available budget, and technology. It also includes the business and social communities that both provide the students and receive the graduates. Finally, the environment eventually includes

the students themselves as they are absorbed into the community after graduation.(147:ix-x; 19:vii-xi; 144:vii-xvi; 41:ix-xvii; 29:39, 52, 75, 84, 143; 48:i; 27:34)

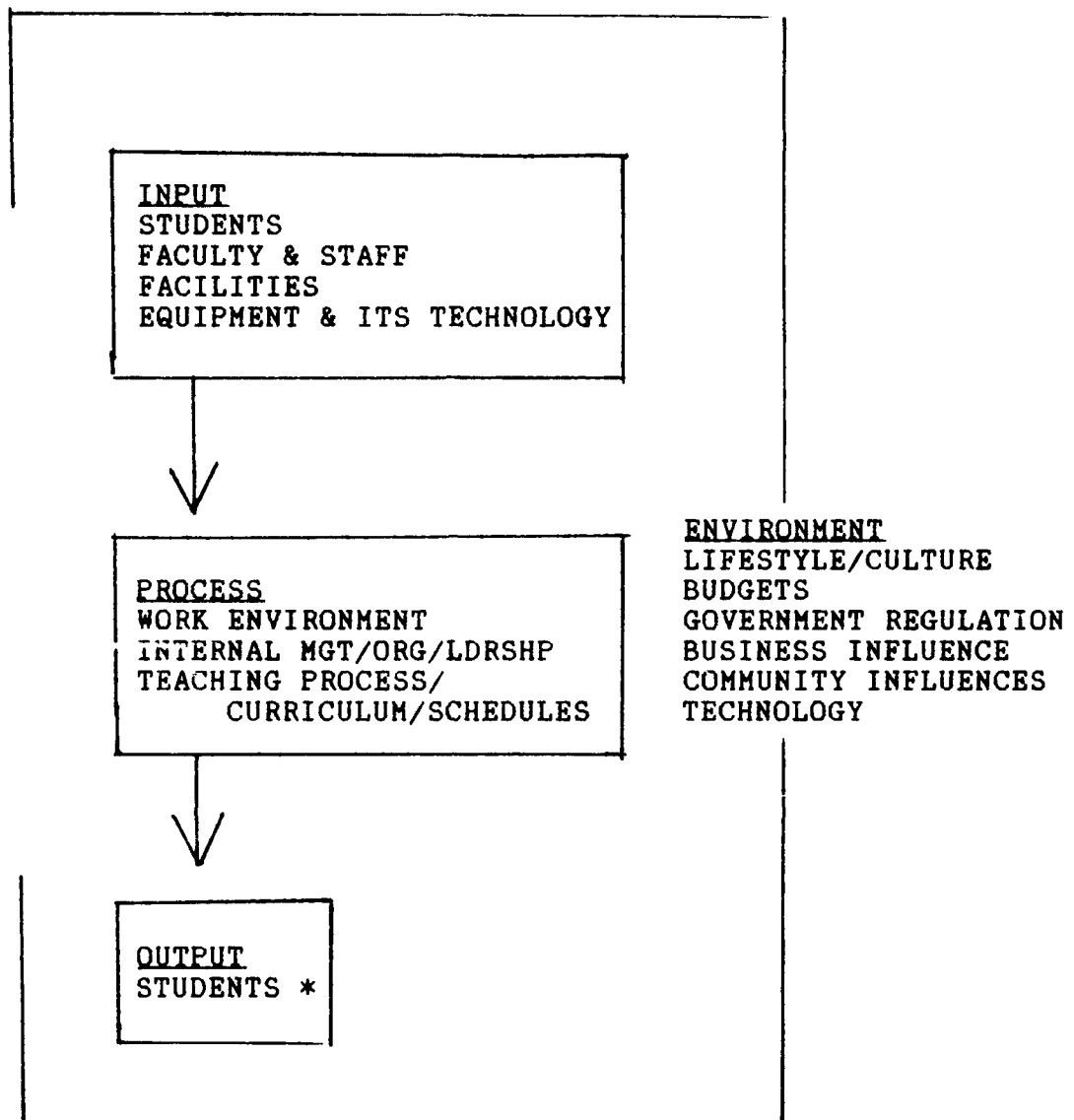
The output of the adult educational system is a person who has "undertake[n] systematic and sustained learning activities for the purpose of bringing about changes in knowledge, attitudes, values, or skills."(105:8) In the case of AWC, the PME output is an educated lieutenant colonel and colonel.

Figure 14 displays the organizational elements of educational institutions. This information adds to the generic organization model by giving it specific attributes of an educational system. The final organization studied is the Air Force.

Characteristics of the Air Force Organization

Organized adult education takes place as a "subsystem of a parent organization," and is influenced by it.(105:9) The Air Force is the parent organization for AWC.

There are two fundamental documents that contain information about the Air Force organization that is useful in determining AWC forecast topics. The first is the Air Force's basic doctrine, AFM 1-1. By definition, doctrine constitutes the most fundamental aspects of an organization.(20:v) Air Force doctrine describes war and warfighting, the principles of war, and interactions with other US military services. (20:1-2 to 1-4, sections 2-5 and 2-6) It describes the medium



* Other output such as research and community service appeared in the source material, but discussion of these topics is beyond the scope of this study

Figure 14: Components of an Educational Organization

in which the Air Force operates and characteristics of operating in that medium.(20:2-2 to 2-4). It also lists missions assigned to the Air Force, and how to apply air power to accomplish them.(20:2-10 to 3-8, chapter 4). These attributes are summarized in figure 15. They constitute the Air Force's most fundamental characteristics, which all officers must thoroughly understand.(20:iii)

The second important document is AFM 1-10, Combat Support Doctrine. While basic Air Force doctrine primarily involves operations, AFM 1-10 involves the other aspect of air power--support. In fact, combat power generated by the Air Force is the combination of combat support and combat operations. (54:1-1)

Combat support doctrine is important to AWC for two reasons. First, over half of the AWC students are support officers. (165:--) Second, AWC is technically a combat support function, since "combat support is the art and science of creating and sustaining combat capability," and the current mission statement of AWC is to "prepare . . . officers to develop, support, and lead" the Air Force.(54:1-1; 14:6)

Combat support doctrine lists the resources of an aerospace system, defines the combat support structure, discusses its eight processes, and addresses eight principles about what makes combat support work best.(54:--) The essence of the doctrine is shown in figure 16. Of particular importance for this discussion is the detailed narrative

Fundamentals of Warfighting

- Essential factors: man, machine, environment
- Commanders must study the interaction of these elements

Principles of War

- | | |
|-----------------------------|--------------|
| - Objective | - Maneuver |
| - Offensive | - Surprise |
| - Security | - Cohesion |
| - Unity of command | - Logistics |
| - Timing and tempo | - Simplicity |
| - Mass and economy of force | |

Air Force Interaction with other Services

- Integrate land, sea, and air forces across a wide spectrum of conflict and crisis
- Specified and unified commands execute and support joint operations

Air Force Medium

- Operates beyond earth's surface in three dimensions
- Characteristics: speed, range, flexibility
- Capabilities: responsiveness, mobility, survivability, presence, destructive firepower, observation

Air Force Missions

- | | |
|-----------------------------------|---------------------------|
| - Strategic air offense | - Special operations |
| - Strategic air defense | - Airlift |
| - Counter air | - Air interdiction |
| - Close air support | - Air maritime operations |
| - Air surveillance/reconnaissance | |

Specialized Air Force Tasks

- | | |
|---|--------------------|
| - Psychological operations | - Intelligence |
| - Electronic combat | - Weather service |
| - Air rescue and recovery | - Aerial refueling |
| - Warning, command, control, and communications | |

Aerospace Application Imperatives

- Employ air power as an indivisible entity
 - Conduct simultaneous strategic and tactical operations
 - Gain control of the air environment
 - Attack an enemy's warfighting capability
 - Consider offensive and defensive action
 - Use the psychological impact of air power
 - Develop a cohesive employment pattern
 - Establish authority for air defense and control
 - Establish effective command, control, communications, and intelligence gathering
 - Properly organize, equip, train, and sustain forces
- (20:--)

Figure 15: Extracts from Basic Air Force Doctrine

Aerospace System Resources

- Organization
- People
- Materiel
- Processes
- Real property
- Money
- Information

Combat Support Structure

- Operate from bases: fixed or mobile, large or small, complex or austere, forward or rearward

Combat Support Process

- 1- Definition of needs
- 2- Acquisition
- 3- Maturation
- 4- Distribution
- 5- Integration
- 6- Preservation
- 7- Restoration
- 8- Disposition

Combat Support Principles

- Objective
- Leadership
- Effectiveness
- Trauma and friction
- Balance
- Control
- Flexibility
- Synchronization

Source:(54:--)

Figure 16: Extracts From Air Force Combat Support Doctrine

explaining the maturation process and the combat support principles. This text reveals the significant talents and skills leaders need to be successful combat support officers. A synopsis of these excerpts is shown in figure 17.

Note that the directive explaining Air Force organization policy and guidance, AFR 26-2, is not used in this discussion, because it explains the principles of how to organize, not the components of the organization.

(134:chapter 1) Such discussion is relevant for an analysis of organization theory, but is not useful in determining topics for forecast study.

Figure 18 shows the Air Force doctrinal elements in the generic organization model format. The final step in determining forecast research topics is to merge information analyzed in this chapter with conclusions reached earlier about AWC's purpose.

Final Analysis and Conclusion

The last step in determining what forecast topics to research is to compare the findings from earlier sections in this chapter, and those from chapter III to find appropriate commonalities that appear relevant to AWC operations.

Figure 18 summarizes a comparison of input characteristics for generic organizations, educational organizations, and the Air Force. It also shows where input characteristics match any of the most common forecast subjects found in the 61 forecast and long-range document review

Maturation Process as it Applies to People

- Process is ongoing throughout one's career
- Includes: duty experience, self-preparation, formal education, and professional education
- Instills the warfighting spirit and skills to perform at the unit, theater, and global levels

The Principle of Leadership

- | | |
|---|-----------------------|
| - Organizational loyalty | - Creativity |
| - Vision/future-looking | - Motivate people |
| - Know what to do | - Create cohesiveness |
| - Know how to do it | - Prioritize |
| - Divest obsolescence | - Create morale |
| - Commitment to Air Force | - Imagination |
| - Reward, discipline, and care for troops | |
| - Master military art and science | |

The Principle of Effectiveness

- Articulate military needs
- Balance effectiveness and efficiency
- Know the acquisition process
- Be aggressive

The Principle of Trauma/Friction

- Occurs from enemy ingenuity, organizational realignment, inadequate plans, malpositioned resources, poor training, lack of cohesion, ineffective equipment, incorrect doctrine, poor leadership

The Principle of Control

- Control people and supplies
- Appreciate how information is processed by people and equipment
- Delegate

The Principle of Flexibility

- Achieved by interoperability, standardization, and commonality of procedures, equipment and supplies among services and allies
- Have flexible combat support structures (bases)
- Use mobility, simplicity, and survivability(54:--)

Figure 17: Extracts from Air Force Combat Support Doctrine on Leadership Talent and Skill

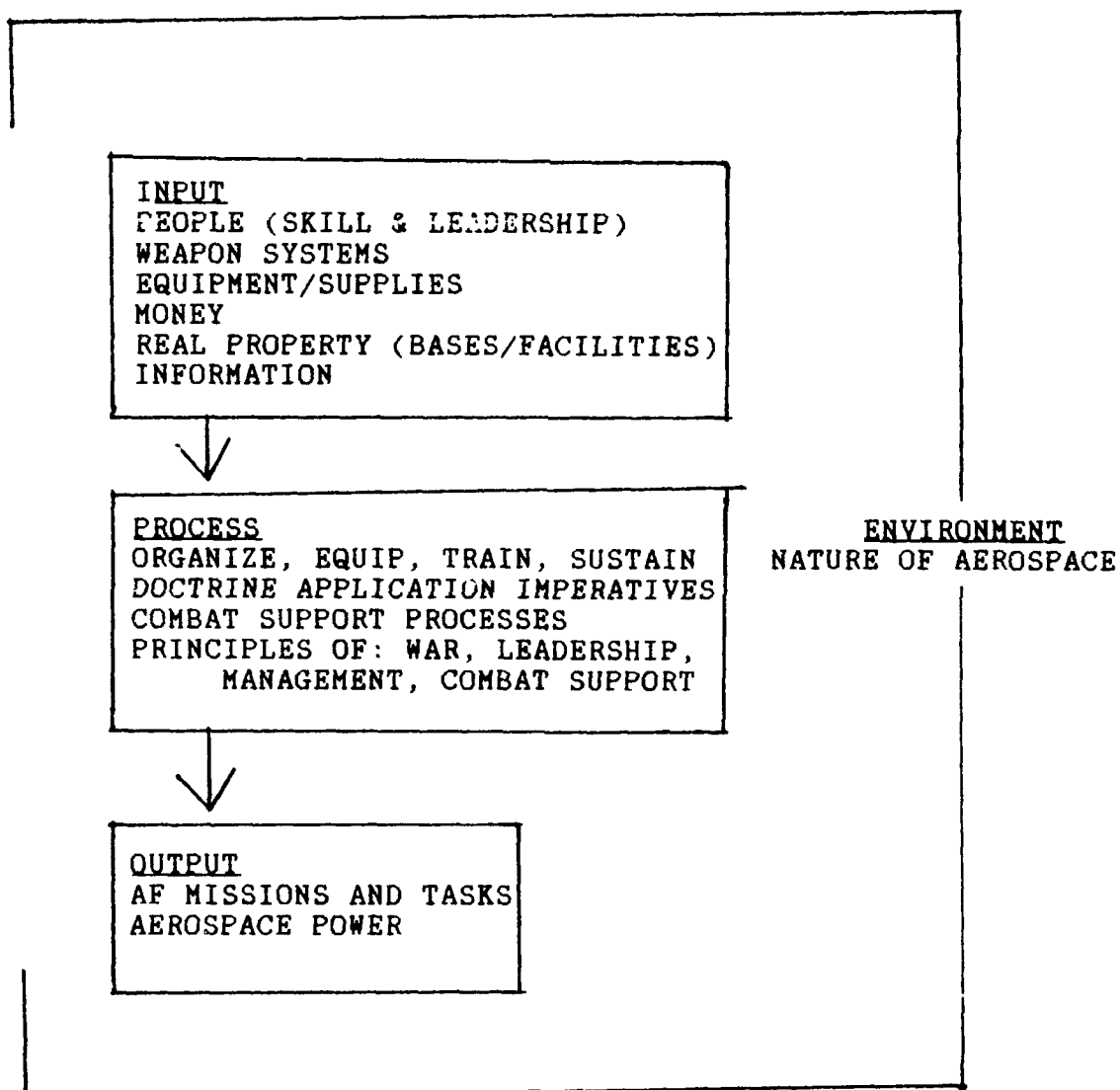


Figure 18: Components of the Air Force Organization

<p><u>Generic:</u> (from figure 13)</p> <p><u>Education:</u> (from figure 14)</p> <p><u>Air Force:</u> (from figure 18)</p> <p><u>Forecast Study Review:</u> (from figure 12)</p> <p><u>AWC Purpose Statement and Parameters:</u> (from chapter III)</p>	<p>Information Energy <u>People</u> <u>Supplies/equipment</u> <u>Physical plant</u></p> <p><u>Students/faculty</u> <u>Supplies /equipment</u> <u>Buildings</u></p> <p>Information <u>People</u>_(leadership and technical skills) <u>Supplies/equipment</u> <u>Real property</u> Money Weapons systems</p> <p><u>People</u> (social fabric, demographics, labor force, leadership. families, health) Technology for equipment and information</p> <p>Obtain, prepare, and equip the Air Force <u>Leaders</u></p>
--	---

(Underlined topics are those most commonly found)

Figure 19: Integrated Analysis to Determine Forecast Research Topics Based on Organizational Input Component

explained earlier. Finally, the figure includes pertinent characteristics from the AWC purpose statement and its parameters which were developed in chapter III. Figures 20, 21, and 22 show the same comparisons for output, process and environmental parameters of the organization model. Elements underlined in each figure indicate the most common attributes. Figure 23 shows those common attributes, which will be the research topics for the AWC forecast study.

The next chapter is an analysis of how far into the future to look when conducting research for these seven topics. The result completes the forecast study framework.

<u>Generic:</u> (from figure 13)	Products Services Ideas
<u>Education:</u> (from figure 14)	<u>Students</u>
<u>Air Force:</u> (from figure 18)	AF missions and tasks Aerospace power
<u>Forecast Study Review:</u> N/A	
<u>AWC Purpose:</u> (from chapter III)	<u>Lieutenant colonels/colonels</u>

(Underlined topics are those most commonly found)

Figure 20: Integrated Analysis to Determine Forecast Research Topics Based on Organizational Output Components

<u>Generic:</u> (from figure 13)	<u>Formal/informal organization</u> <u>Management, group dynamics, innovation,</u> <u>Power/politics</u>
<u>Education:</u> (from figure 14)	<u>Formal/informal organizations</u> <u>Teaching methods</u>
<u>Air Force:</u> (from figure 18)	<u>Organize, equip, train, sustain the force</u> Doctrine application imperatives Doctrine processes Principles of war, combat support, <u>Leadership, Management</u>
<u>Forecast Study Review:</u> (from figure 2)	Work environment (<u>facilities</u> , atmosphere) <u>Teaching processes</u> <u>Leadership/management</u> <u>Technology</u>
<u>AWC Purpose:</u> (from chapter III)	<u>Obtain, prepare, employ forces</u> Joint/combined operations Military strategy <u>Leadership/management</u> <u>Technology</u>

(Underlined topics are those most commonly found)

Figure 21: Integrated Analysis to Determine Forecast Research Topics Based on Organizational Process Components

<u>Generic:</u> (from figure 13)	<u>Economy</u> <u>Culture</u> <u>Demographics</u> Natural resources competition Activities furnishing input Activities receiving output	<u>Government & politics</u> <u>Financial capability</u> <u>Technology</u>
<u>Education:</u> (from figure 14)	<u>Government regulation</u> <u>Budgets</u> <u>Social/cultural aspect of students</u> <u>Technology</u>	
<u>Air Force:</u> (from figure 18)	Characteristics of the aerospace	
<u>Forecast Study Review:</u> (from figure 12)	<u>Economy</u> <u>Geopolitical</u> (threats, power, conflict, 3d world, military) <u>Budgets</u> <u>Social fabric/culture/values</u> <u>Demographics</u> <u>Technology</u> Environment (pollution, energy, conservation)	
<u>AWC Purpose:</u> (from chapter III)	<u>Armed conflict</u> <u>National and international affairs</u> <u>Technology</u>	

(Underlined topics were most commonly found)

Figure 22: Integrated Analysis to Determine Forecast Research Topics Based on Organizational Environmental Components

Geopolitics

- Nature of conflict *
- Nature of the Air Force
- International conditions
- Domestic conditions

Demographics

- Students and military faculty
- General (civilian work force, and those AWC graduates will lead)

Social Fabric

- Families
- Values/culture
- Lifestyles

Workplace

- Facilities
- Management/organization/interaction

Technology

- Computers
- Information
- Communications
- Transportation
- Weapons/military systems

Money

- Military budgets
- The economy

* Geopolitics and the nature of conflict are addressed in separate chapters in this study

Figure 23: Air War College Forecast Topics

CHAPTER V

SELECTING THE FUTURE FORECAST TIME PERIOD

The Need for Longer Vision in a Time of Rapid Change

The time-span for decisions is lengthening rapidly. Peter Drucker believes that the "lengthening of the time-span of commitment is one of the most significant features of our age." (66:11) Compounding the difficulty of projecting the impact of today's decisions farther and farther into the future is the rapid increase in knowledge. Half of what an engineer knows today is out of date in five to seven years, and the National Institute of Health updates 85 percent of its computer data every five years. (152:7; 47:32) On average, information that businesses need in order to operate successfully and stay up with change is doubling every 2 1/2 years. (98:2)

The obsolescence factor results from this situation. For instance, the British Admiral Nelson's ships were 40 years old and still state-of-the-art when he fought at Trafalger. The Enterprise was obsolete before World War II. The B-17 took about four years to develop and construct, and had a life of four years. The B-29 took six years and was operational

for four, while the B-36 took ten years to develop and build, but operated for only three. The Navaho took six years to develop and was never fielded because it was obsolete before it was completed.(151:100)

Further, the time from research of a product to production is decreasing rapidly. For photography, 112 years went by before it was widely used. It took 56 years for the telephone to make this transition, 35 years for the radio, 15 for radar, 12 for television, 6 for the atomic bomb, and only 5 years for the transistor.(152:6) From 1990 to 2000, the time between product development and completion of its life cycle is expected to be between three and five years.(163:7)

The result of these phenomena is the need to look farther into the future, and to look forward with more accuracy. Therefore, it is critical to correctly determine the forecast time period. This chapter presents the analysis of three sets of data to determine the correct time period for the AWC forecast. The first data includes the time periods selected by other forecasters. The second shows the planning time lines for resources and systems that impact AWC operations. The third analyzes the future impact of decisions AWC leadership makes today.

Analysis of Time Periods Used in Forecast Studies. Books.

Articles. and Other Long-Range and Futures Documents

The array of information in figures 24 and 25 includes the timespans for 21 forecast or long-range documents taken

<u>Document</u>	<u>Timespan</u>	<u>Years</u>
Logistics 2010	1988-2010	22
Alternative World Scenarios for Strategic Planning (Army War College)	1988-2020	32
USAF Personnel Future Study, "Now to the Year 2000"	1988-2000	11
The AF Science and Technology and Development Planning Program	1989-2001/2006	10/15
Army Long Range Planning Guide	1998-2008	10
USAF Engineering and Services Future Vision Study	1990-2010	20
Palace Agenda-The AF Strategic Plan for Civilian Personnel Management	1989-1990	10
Destination 2003 Report(HQ AFLC/XR)	1983-2003	20
AF Futures: Probabilities,scenarios, and Indicators (Draft from RAND)	1988-2010	22
AFMED 95	1988-1995	6
AF Innovation Task Force Findings	1986-2025	39
Army "Long Range Personnel Planning"	1989-2009	20
Army Global Trends of the Early 21st Century	1989-2010	21

Figure 24: Forecast Time Periods Covered in Military Studies,
Books, Briefings and Articles

<u>Document</u>	<u>Timespan</u>	<u>Years</u>
Forecast 2000	1984-2000	16
"Toward 2002"	1986-2002	16
July 19, 2019	1986-2019	33
"Into the 21st Century"	1988-2000/2010	12/22
Management of the US Government 1980	1989-2000	11
Schools of the Future	1985-2000	15
"Facing Issues Toward the 21st Century"	1989-1999	10
Continuing Education in the Year 2000	1987-2000	13

Figure 25: Forecast Time Periods Covered in NonMilitary Studies, Books and Articles

from the 61 sources used in chapter IV. Of the 40 sources not included, most were not available to the author for review. Of those available, only those with clear intent by the author to establish a time period were included. For instance, a source may have presented data on one topic covering 5, 7, and 25 years. The same study may not give any time line for data on another topic but just present data as "future trends." A third topic covered by the same study may include forecast information for only two to five years into the future. Figures 24 and 25 do not include those types of documents.

The "Timespan" column shown in both figures represents the inclusive years from the published date of the document to the forecast time clearly evident in the study. The "Years" column shows that none of the documents looked forward less than six years or between 26 and 30 years, and only three looked beyond 30 years. The average forecast time period is 17.9 years. When the three longest forecasts are not included, the average forecast looks into the future 15.1 years.

This information is important as a benchmark for deciding the right forecast time period for this study. The next section analyzes the planning time associated with significant resources and activities that impact AWC operations.

Planning Time Periods for Significant Resources and Activities
that Impact Air War College

There must be some logic in selecting the right time range for planning. In principle, it seems to be in the nature of investment of resources of the enterprise. . . . Investments other than for plant and equipment should likewise be based upon a planning period that will anticipate the recovery of investment.(104:36)

The forecast topic list developed in chapter IV provides the best information on what is critical to AWC operations. A number of subjects related to these topics have measurable time periods associated with them. This section explains those times and their importance to AWC.

The primary economic factor for AWC is the budget process. Changes in Congressional direction in the last few years created the Six-Year Defense Program (SYDP). This program requires budget submittals for a six-year period. Lead time to develop the budget and process it through various reviews adds about two more years to the process. The result is that work for the budget period fiscal years (FY) 92-97 must begin in FY 90, which creates a planning time of eight years for requirements in the sixth year of the budget (FY 97).(34:--)

The college also needs facilities. The average age of facilities in the Air Force is around 35 years, with two peak construction periods. The first occurred in the 1920s and the second in the 1950s.(131:--)

The AWC building is 34 years old, and had its last major renovation in 1984.(183:--)

The next major renovation is scheduled for FY 94.(34:--)

An associated benchmark is the lead time for new construction in the Air Force. To build a new facility that enjoys a medium-high to high priority on the command priority list, the time from submitting the first planning paperwork until the construction is complete is seven to nine years. For a major renovation with a similar priority, the planning-to-completion time is two to four years.(131:--)

Technology is another important influence on AWC. As described earlier, the technology knowledge base is expanding rapidly. In addition to the examples cited earlier, consider the following: by 2000, computer capabilities will be ten to one hundred times greater than they are today; engine propulsion is expected to double by 2000; revolutionary events in the computer industry occur about every two years; since World War II there has been more technological change than has occurred since the beginning of recorded history.

(152:6; 79:5, 7) By the late 1990s, knowledge will double every two years.(74:6) A review of these observations shows that technology changes rapidly. Based on these examples, significant changes in technology appear to take place about every five years, on average.

Time periods associated with students and faculty are based on expected future career time in the Air Force of AWC students, and time at AWC for the faculty. Lieutenant colonels and colonels must have less than 20 years in service to be eligible to attend AWC. The grade (lieutenant

colonel/colonel) and the 20-year restriction indicate that Air Force AWC students have between 15 and 20 years of service upon arrival.(136:150,155) Except for officers who become generals, the mandatory retirement of 30 years of service means that AWC graduates have 9 to 14 years of their career remaining after graduation. The three-year service commitment incurred after graduation means that most officers will have a minimum of three years remaining in their career to a maximum of 14, depending on their time in service when they attend AWC.

The AWC faculty consists of 48 military colonel and 13 civilian positions.(113:--) The military faculty's tenure is normally three years, with selected members remaining longer.(14:1) The tenure of the AWC commandant and the AU commander is also short. Historically, the average AWC commandant's assignment length is two years, and that of the AU commander is also two years.(13:-- ; 7:--)

The civilian faculty consists of ten full-time members, and three members with one-year contracts that can be renewed. The college has received approval and funding for an additional six civilian positions, two military-to-civilian conversions, and three more contract professors, to be hired for academic year 1991.(34:--) For these reasons, today's tenure situation for the civilian faculty is not included in the information used to determine the forecast research time

period for this study. The information simply is not indicative of the future.

The curriculum development process is another aspect of AWC operations that has a planning time. The AWC regulation governing the school's curriculum, AWC Regulation 53-2, states that major curriculum changes should occur every two years. To meet this schedule, the faculty considers the AWC Five-Year Plan, a document that "identifies out-year trends, outlines institutional goals in key mission areas, proposes programs that support these goals, and provides estimates of out-year resource requirements." (12:1) The faculty reviews the Five-Year Plan in June, and works curriculum changes from that point through February of the following year for use in the next two academic years. Given that there must be some time to prepare the Five-Year Plan, it takes about one year to develop curriculum for the next two AWC classes, or a three-year planning cycle.

One other time period of interest is the weapon system development time. Air Force Systems Command anticipates a 10 to 15-year development period to field new systems.

Figure 26 summarizes the time periods discussed. The next section looks at the last two considerations in selecting a future time period. First, the consideration of what Peter Drucker calls the "futurity of decisions," or the future impact of decisions made today. Second is information about what chapter II described as the decision makers' "comfort

BUDGET			
(Develop SYDP)	-----8		
* FACILITIES			
(Plan & Build New Facility)	-----7 to 9		
(Plan & Do Major Renovation)	-2 to 4		
TECHNOLOGY			
(Time for Next Revolutionary Event to Occur)	-----5		
STUDENT AF CAREER (POST AWC)	--3	to	14
MILITARY FACULTY TOUR	--3+		
AWC COMMANDANT TENURE	-2		
AU COMMANDER TENURE	-2		
DEVELOP CURRICULUM	--3		
DEVELOP NEW WEAPON SYSTEM	-----10 to 15		

* AWC Facility (Building 1401):
 Age of Building: 34 years
 Date Last Major Renovation Completed: 1984
 Date Planned for Next Major Renovation: FY 94

Source: (34:--; 183:--)

Figure 26: Time Periods Associated with Air War College Resources, and Operations

index," or the time period beyond which the decision maker discredits the forecast.

Future Impact of Today's Decisions and the Decision Makers' Comfort Index

By combining the time lines shown in Figure 26, the evidence is clear that decisions made today have long-term impact. The result of combining the sequential events that affect each other and the resulting potential long-term impact is astonishing. Figure 27 shows examples of the future impact of today's decisions from an AWC operations perspective, and from the perspective of the AWC graduates, whom the school has responsibility for educating, so they can make those decisions.

Interviews with senior AWC military faculty members clearly indicate that their comfort index is around five years.(188:--) Possible explanations for this future time focus is the short faculty tenure, short tenure of the AWC commandant and AU commander, the curriculum development process, or the rapid changes taking place in knowledge. Another explanation may be that the question of what information about the future is needed is actually perceived as what information is believable. One futurist explains that

. . . there is a tendency for companies to arbitrarily limit the short range [forecast] to six months or one year, and the long-range to three to five years. These periods are often compromises. . . . [T]he somewhat arbitrary limitation of the long-range . . . is usually based . . . on the prevailing belief that the degree of uncertainty over long periods makes planning of

The following two scenarios are designed to show that input and decisions made today often have long-range implications. For instance, scenario I shows that what is included in an AWC Five-Year Plan could affect AWC operations 35 years later as the effects of decisions made because of what was in that plan unfold.

SCENARIO I

In January 1990 work begins to develop the AWC Five-Year Plan that will be briefed to the faculty as an input for curriculum development. The Five-Year Plan impacts the curriculum. That curriculum is used for the AWC classes of 1991 and 1992. One graduate, a 15-year lieutenant colonel is influenced by the curriculum, particularly the areas originally impacted by information in the Five-Year Plan. This officer is promoted to colonel, and remains on active duty until 2006, the mandatory retirement time with 30 years of service.

The following are examples of the futurity of decisions made during the year that the 1992 AWC graduate retires:

Decision on New Facility Construction:

- 1990 Five-Year Plan developed by AWC
- 1992 Affected curriculum taught to students
- 2006 Decision to construct facility
- 7-9 Years to plan/build = 2013/2015
- 35 Years average facility life = 2048/2050

Decision on New Weapon System Development:

- 1990 Five-Year Plan developed by AWC
- 1992 Affected curriculum taught to students
- 2006 Decision to develop new weapon system
- 10-15 Years to develop system = 2016/2021
- 10 Year estimated life of system = 1026/2036

Decision affecting retention of AF member with four years in service that impacts a 30 year career

- 1990 Five-Year Plan developed by AWC
- 1992 Curriculum used to teach students
- 2006 Decision made affecting retention
- 26 Years for 30 year career = 2036

Figure 27: The Futurity of Present Decisions Using
Air War College as the Example

SCENARIO II

In July of 1990, the AWC Commandant discovers through a briefing by his new "Futures Concept Group," that future attributes of "smart house" technology can be applied to the AWC building. Specific application would be to detect physical and electronic intrusion. This technology, plus minor facility alterations, would allow secret discussions to take place in seminars, even though people without clearances were in the building.

The Commandant directs that the budget include funds for the system. The first year funds can be put into the budget is FY 93, since the budget for FY 92 was briefed in early 1990. The AWC security officer says an upgrade of the system will be needed in five years, which is the average time between technological advances.

The futurity of the Commandant's decision is shown below:

July 1990	Decision to procure
October 1992	Funds available to buy the system
1993	Probable time system will be installed
1998	Last year of useful life

Figure 27: The Futurity of Present Decisions Using Air War College as the Example (continued)

questionable value. . . . Observations of business planning leads to the belief that the long run period tends to be picked . . . because such a length of time was believed to be predictable." (104:35-36)

Whatever the reason, this perspective must weigh heavily in deciding on the forecast time period.

The final section integrates all of the information presented in the chapter and makes a judgment on the appropriate time period for this study.

Conclusion

Most forecasts identified in chapter IV aimed for a future time frame of about 15 years. In no case was the time period less than 5 years, and rarely were forecast horizons beyond 20 years. The sequential linkage of events related to AWC operations, the AWC responsibility for educating officers to make decisions far into the future, and the even more distant impact of those decisions, shows that decisions AWC leaders make today easily have impacts into the late 1990s, and often well into the 21st century. Based on the evidence depicted in figures 24 through 26, the forecast time period for this study should be 15 years.

However, the forecasting objectives explained in chapter II are significant considerations when selecting the proper time period for forecasting. The forecast must be personally credible to decision makers so they will confidently include them in their decision-making process. For this reason, and because the indication is that AWC

leadership appears to be uncomfortable with forecasts made beyond 5 years, the 15-year time period is clearly too long.

The 15-year forecast period is probably best. However, it is also probably not credible with AWC leadership. The five year time frame is within the AWC leadership's comfort factor, but is obviously too short if the review of the 61 documents presented in chapter IV is valid. The list of time periods shown in figure 26 lead to using the eight-year SYDP process (which includes advance time for preparation and reviews) as a key indicator of the best forecast time to use under the circumstances. Besides falling between the 5 and 15-year extremes, the SYDP process is fundamental to virtually every aspect of AWC operations. Therefore, using it as a baseline makes sense. This baseline, if extended by only two years, matches the AU requirement for AWC to have a ten-year strategic plan.

This study will use ten years, or 1990 to 1999 for its research time period. While some of the information presented in the following chapters references the year 2000, 2005 and so forth, that is acceptable for the forecast because it shows trends that are obviously applicable to the years just preceding it. Further, forward vision should be done in a continuous flow or incremental fashion.(45:3-292) Therefore, forecast information will not concentrate on just 1999, but will show the evolution of trends where possible by presenting

information on probable occurrences throughout the ten-year forecast period.

The next several chapters contain the ten-year forecast for the topics selected in chapter IV. They will be the basis for determining implications for AWC's future operations and recommending strategic issues for AWC leadership action.

CHAPTER VI

THE WORLD SITUATION

The world of the 1990s promises to be one of many changes. President Bush, in his January 31, 1990, State of the Union address, explained that "the events of the year just ended--the revolution of 1989--have been a chain reaction, change so striking that it marks the beginning of a new era in the world's affairs." (93:1A) This chapter offers insights into that new world. Though the world situation is changing, there are probable trends that are valid for the next decade.

Geopolitics

The world is rapidly becoming multipolar.

(1158:vi; 83:5; 172:46) One study predicts that there will continue to be two superpowers through the 1990s, but there will be a growing number of "medium powers" emerging. These emerging powers will slowly share the dominant role in world affairs with the superpowers. (162:20; 117:xi) Another study indicates that the superpowers will lose much of their influence through the 1990s. (83:5) One predicts that in the future, the US will be just another partner at the negotiating table, rather than the chairman of the board. (162:18)

Communism, as the world has known it for the last 70 years, will cease to exist on a wide scale basis. Virtually every nation in Eastern Europe is 'going their own way,' free from communist domination. These nations are putting strong pressure on the Soviets to remove troops from their soil.(139:9) The Berlin Wall, a symbol of communist dominance in East Germany since 1961, fell in November 1989. Since that time, 60 percent of the East German population has visited the West. About 2,000 leave permanently every day.(139:10) President Bush, in his 1990 State of the Union address, said that "communism [is] crumbling."(40:1A) After events of 1989, the Soviet Union is the last Warsaw Pact nation that gives the Communist party a power monopoly in its nation.(95:13A) On February 7, 1990, the Soviet Union's Central Committee agreed to "give up the Communists' constitutional monopoly on power."(94:1A) East European nations, now free from communist domination, want stronger ties to the West. Further, the Communist Economic Community (COMECON), the Warsaw Pact's equivalent to the European Economic Community, will dissolve in the future.(139:9)

Tensions will shift from an "East-West" confrontation to a "Have-Not" (or "North-South") confrontation.

(73:17; 16:13) By 2010, nations classified as "Have-Nots" will contain 76-81 percent of the world's population. For instance, Mexico's population will increase by 38 percent,

India's by 41 percent, and Africa's (as a continent) by 102 percent.(83:6)

The world will be more economically interdependent.

(23:19; 24:13; 167:14; 117:71; 83:5; 88:31; 16:13; 73:17)

Trade will become more unrestricted among nations, and the major world's stock markets will be more interactive.

(47:31; 24:10; 125:--)

Some sources predict a move to more protectionist trade measures.(73:17; 139:10)

The trend toward interdependence will include the US.(57:8; 33:4, 13)

The US will rely more on alliances in the 1990s.(83:14)

There will be more intense competition for world markets among nations through 2000.(117:72; 16:13)

Through the 1990s, there will be continued dependence by developed nations on oil supplied by the third world.(16:13)

As we approach the 21st century, nations will have less and less control over the value of their own currency--a major source of economic power.(24:9)

There will be regions of economic growth and poverty.

The trend is toward "financial service nodes" as centers of global economic management. One report suggests that the nodes will be New York, London, and Tokoyo.(24:9; 33:13)

The US will continue the trend to a bicoastal nation. Over 40 percent of the US population lives in the 16 coastal states, and, in the 1980s, had 70 percent of the real economic growth of the US. Exceptions will be the St Paul-Minneapolis and Detroit-Ann Arbor areas.(24:20)

The European Economic Community will be a major world economic power by 2000.(162:4;

97:76) Through the 1990s there will be unemployment above 40 percent in Mexico and Egypt.(162:13) The 1990s outlook for Africa is "poor," and the same can be said for Latin America.(117:71)

The Pacific Basin will be the new world economic power by 2000.(24:5-6; 162:13; 125:--; 132:--) Toward 2000, the Pacific rim will have about 20 percent of the world's gross national product (GNP). That share will be greater than the total GNP of North America and Europe combined at that time.(57:8) The US government-sponsored Working Group on the Future Security Environment reported in April 1988, that the dominant Asian powers in the future will be China, South Korea, Taiwan, and Japan. The report explains that between now and 2010, the GNP of each of these nations individually will equal or exceed that of the US (US-2.8 percent, China-4.7 percent, South Korea-4.9 percent, Taiwan-5.8 percent, Japan-2.8 percent).(162:2)

Urbanization will be a serious problem. In 1980, 41.1 percent of the world's population lived in cities. There will be a steady increase in worldwide urbanization such that by 2000, 50 percent of the world's population will live in cities, and by 2025 it will be 58 percent.(15:59; 83:6) By 2000, Mexico City will have 30 million people, or 77 percent of that country's entire population.(83:6; 24:15) Shanghai will have 25 million people, and Bombay 17 million. The

infrastructure of the cities will not be able to support the increased population.(24:15)

The 1990s will see India and Brazil emerge as key regional powers.(167:13; 97:76; 127:4) By 2010, India's GNP will grow to almost equal that of France at that time, and Brazil's GNP will approach that of the United Kingdom.(162:4)

Japan will become a dominant world power in the 1990s.(125:--; 83:5; 97:76) Dr Henry Kissinger commented in an interview that he believed Japan will become a "significant military power," and may be the "predominant financial power in the world" in the 1990s.(127:4) Former Undersecretary of Defense, Fred Ikle, explains that, by 2000, Japan could be a nuclear power.(172:46)

China will be an emerging world power in the 1990s.(97:76; 83:5; 64:1; 16:12-15; 167:13) One China expert explains that "for the first time in over 100 years, China stands squarely on the world stage as an emergent international power. . . . This has irrevocably altered the world power equation."(73:22) Other sources list China in the Pacific Basin group of nations that will dominate world production in the 1990s.(162:2) One author predicts that China may have a GNP equal to Japan's by 2010.(64:7) As a counterpoint, one source predicts that China will remain a poor nation in the future.(33:10)

World politics will be marked by fragmentation, rapid change, and uncertainty in the 1990s.(33:11; 78:--; 73:15)

In early 1990, Richard Perle, former Assistant Secretary of Defense for International Security Affairs, said that "the events that are driving history at this moment are largely beyond the control of the individuals who lead the superpowers." (139:11) World order will become "a din of national and subnational voices, each clamoring for rights and prerequisites unfettered by the burdens of responsibility to any higher order." (73:15) Nations will have trouble determining their national interests because of multidimensional relationships. (132:--) Examples are Canada's differences over language, Ireland's religious differences, differences in Spain over local nationalism, and Nigeria's tribal and cultural rivalries. (24:13) One author explains that the next 20 years will be a "period of uneven transition to a new situation." (162:14) There will be pockets of "religious extremism" through the 1990s. (73:17) Nationalism will increase in the third world. (73:16)

There will be increased nation-state and non-nation-state partnerships in the 1990s. (73:18) Key partnerships that will be very influential in the future include East Asia and the US, and multinational corporations. (83:7) Between 1985 and 2000, there will be "a proliferation of new international actors--multinational enterprises, international agencies, and newly sovereign states." These power centers will focus on possession of resources or short-term mutual interests. These short-term arrangements are

like "floating coalitions." (73:16) In February 1989, five African nations resolved differences covering decades, and formed the Arab Maghreg Union (UMA). The organization includes Mauritania, Libya, Algeria, Morocco, and Tunisia. Its purpose is economic development and is reportedly aimed at responding to the potential increase in the European Economic Community's economic power in the 1990s. (138:A18)

World debt will continue to be a problem in the future. (73:17; 127:4) In 1987, over 30 prominent world economists predict worldwide depression unless major powers address and solve the debt problem. (28:A1) The US is now the world's largest debtor. (167:14)

Threats to US Security

Threats to US national security will be difficult to determine and will change over time. (83:14) The International Institute for Strategic Studies of London explains that the world of the 1990s will be "much less stable, much more messy" than in the past. (166:A50) The 1990s will have more "fanatical" groups that may threaten US interests, to include more linkage between the drug trade and terrorist factions. (73:28) Politics, military considerations, economic and technological competition, and demographics may well be the basis for future conflicts. (73:15) One source explains that the US will have a difficult time deciding whether or not to become involved in a future conflict. Further, if it is in the US interest to get involved, the next difficult question

will be which side to support.(64:13) One report presents a possible scenario where conflict could involve a large mercenary army employed by one or more multinational corporations.(73:23) "The world itself promises to become a polycentric armed camp with frequently changing centers of power."(73:15)

There will be dramatic increases in the proliferation of advanced conventional weapons in the third world, to include chemical and biological weapons.(109:8; 97:80; 57:9; 64:1; 83:10, 14; 158:vii) "Relatively backwards nations" will have sophisticated advanced weapons in the future.(17:4) One writer explains that third world nations are "arming themselves to the teeth."(83:13) Third world nations will increase their spending for defense in the next 10 years.(73:16) Many third world countries have or will have arms production capabilities. Examples include India, Brazil, North and South Korea, and Egypt.(64:9; 33:13)

More nations will have nuclear weapons capability.(33:9; 97:80; 73:16; 83:10) By 2000, "traditionally less stable nations" will have nuclear weapons.(17:4) Argentina, Brazil, India, Iran, Iraq, and Israel are openly developing ballistic missiles. North Korea, Libya, and Taiwan have secret programs to do so. Further, Afghanistan, Algeria, Cuba, Egypt, Indonesia, Kuwait, Pakistan, Saudi Arabia, Syria, and North and South Yemen are getting missiles from other nations.(166:A50; 83:12)

Major arms control agreements will take place between the US and the Soviet Union.(33:9) President Bush's January 31, 1990, proposal to reduce troop strength in Central Europe to 195,000 troops on both the US and Soviet side, was generally accepted by the Soviets, except for discussion of the remaining 30,000 troops the US would have in southern Europe. President Gorbachev suggested limiting the total number of troops in Europe to Bush's 195,000 figure.(86:2A)

The most likely future war involving the United States will be at the low end of the spectrum of conflict, primarily involving increasingly capable third world nations.(73:26-27; 83:14, 22; 33:12; 64:35) From now through the 1990s and into the early 21st century, there will be substantial terrorist activities with increasing levels of violence.(109:8) One author is more explicit: "Terrorism will stand alone as the predominant form of conflict over the next two decades (1985-2000).(73:28) Through 2000, there will be an increasing number of regional conflicts, with the greatest coming from the Middle East, North Africa, Central America, and Sub-Saharan Africa.(17:4) Low intensity conflict will be the "violence of choice" in the 1990s.(33:3; 57:9) The Army reports that its future force structure will result from increased emphasis on low intensity conflict.(68:1)

The Soviet threat in Europe will diminish through the 1990s. During January and February 1990 Senate Armed Services hearings, Richard Perle, former Assistant Secretary of

Defense for International Security Policy, said that the threat from the Soviets in the 1990s will "diminish sharply." He explains that it is "no longer feasible to imagine a cohesive Warsaw Pact, led by Soviets." The current Director of the Central Intelligence Agency (CIA), William Webster, agreed with Pearle's assessment during his own testimony. (115:14) Current Secretary of Defense, Richard Cheney, reported to Congress in February 1990 that he believed the Soviets would pull out all their military from Eastern Europe by 1995.(40:1A) Indeed, a February 1990 report says there is extreme pressure from Eastern European countries for the Soviets to withdraw troops from their nations. The Warsaw Pact is seen as becoming a nonentity.(139:9)

World events involving the superpowers, as well as the third world, must be integrated with other information about the future to gain a clearer picture of how it will affect AWC operations. The next chapter presents demographic information to better focus that future environment.

CHAPTER VII

DEMOGRAPHICS

Populations and Ages

The demographic aspect of the future involves indicators such as birth rates, age, population size and mix, labor force numbers and distribution. Demographic information through the 1990s is reasonably reliable, since most of those who affect it are already living.

The population rate for developed nations will decline, while it will increase markedly in developing nations. (79:cptr IV pg. 1; 15:59, 64; 59:34-35; 99:xiii) The population growth rate in Europe was only .3 percent in 1985, and will be .2 percent by 2000. Japan's growth is only .6 percent today. (79:cptr IV pp. 7, 8) About 93 percent of the world population growth will be in developing nations as the 21st century approaches. (79:cptr IV pg. 6) By 2000, 70 percent of the world's population will be in only eight countries, none of which are today considered among the developed nations of the world: China, India, Indonesia, Brazil, Pakistan, Bangladesh, Nigeria, and Mexico. (24:17)

The average age in developed countries will rise, while there will be increasingly younger populations in developing nations. (79:cptr IV pp. 3, 7, 8, 9; 16:9; 15:74)

The result will be stark differences in the average age between people in developed and developing nations. Even today, 40-50 percent of the population in Africa is under 15 years old. The figure is 40-50 percent in Latin America, with Mexico having 42 percent under fifteen. In contrast, only 22 percent of the population is under 15 in Canada and the US, while in most European nations it is under 20 percent. (24:17; 60:47)

The US birth rate is slowing and the population is aging. (96:811; 79:cptr IV pg. 1; 112:5, 38-39; 130:A5; 16:7; 68:10; 21:63; 163:10; 16:9; 17:7; 26:67; 99:75) In 1950, the number of births per thousand was 24.1. In 1985 it was 15.7. In 2000, it will probably be around 13.0. (112:38-39; 96:811; 79:cptr IV pg. 1) The median age of the US population in 1989 was 35.5, but will rise to 39.0 by 2000. (163:11)

In 1960, 16.7 percent of the US population was over 65. By 1985, that figure rose to over 28 percent. The number of very old people, those 85 and older, rose from less than 1 percent to over 2.7 percent in the same period. In the next 20 years, the very old may make up about 17 percent of the total population. (24:24; 110:--)

By 2000, the elderly will make up some 20 percent of the US population. (112:5, 24:23)

The result will be families that have four to five generations

living. In other words, adults will live to see their great-grandchildren, and, in some cases, their great-great-grandchildren.(24:24; 121:10)

The US Labor Force

Labor force demographics focus on the distribution of the labor force in the 1990s. The analysis indicates where changes will occur and the types of people that will comprise it.

Women will constitute an ever increasing share of the labor market. (163:13; 117:91; 163:13; 187:17; 99:76) Women will comprise 60-63 percent of new entrants into the labor force from 1985 to 2000.(47:35) A 1988 study by the Institute of Educational Leadership predicts that women and immigrants will constitute 83 percent of new entrants in the work force by 2000.(89:D1) Another study sets the rate at 67 percent between 1987 and 2000.(99:xx)

The total rise in the percentage of women in the work force since 1950 has been dramatic. In 1950, women made up about 30 percent of the work force. By 1986, the share was about 44 percent, and in 1988 it was 44.5 percent. A 1985 survey shows that 67 percent of the women who were 35-39 were in the labor force. Those women are 40-44 years old today.(121:5) The US Army reports that they had just over 20,700 women in their service in 1973. In 1989 the number was almost 83,800, a 304 percent increase.(110:1) By 2000, it is

expected to be 47 percent, a 64 percent increase from the late 1980s.(47:35; 112:5; 31:--)

Another indicator is the percentage of the work force age women who have jobs or are looking for one. In 1978, 56 percent were in this category. By 1998, the figure was up to 67 percent.(186:A1)

The number of married women in the work force will continue to increase through the 1990s.(187:17; 96:61; 117:91)

The number of married women in the work force more than doubled from 21 percent in 1950 to 50 percent in 1980, and stood at 56 percent by 1987.(100:87; 24:25) In 1987, almost 60 percent had children under six years old, and 51 percent had children less than one year old. These figures are about double those from 1970.(100:87)

Through the 1990s business and the military will have a smaller youth population from which to draw new entrants.
(130:A5; 89:D1; 68:9) The number of 16 to 24 year-olds will shrink from 30 percent in 1985 to 16 percent in 2000.(47:36; 99:xvii) The big number of "baby boomers" will be middle aged (36-54) by the turn of the century.(60:47)

There will be a large growth in the number of minorities in the work force in the 1990s. (163:11; 135:4; 24:24; 99:89) In the early 1970s, blacks composed 10-11 percent of the work force. By the late 1980s, the number increased to just over 11 percent, and will increase to 12-17 percent by 2000.(163:14; 47:35) Asiatics will become about

four percent of the work force in 2000, an increase from one percent in the early 1970s.(163:14) Hispanics will steadily increase their share of the US work force through the 1990s. Their growth rate of over 70 percent will mean that they will become 29 percent of the overall work force by 2000.(47:35) One study indicates that Hispanics will supplant blacks as the largest US minority by 2000.(187:17) In aggregate, nonwhites will compose almost 30 percent of the new entrants into the work force by the year 2000.(78:--; 187:17)

Of importance is the immigration factor, both legal and illegal. Some studies show a large increase in immigration in the 1990s, and one study predicted that immigration into the US may reach "astronomical proportions before 2000."(117:88; 83:14)

The US military will reflect these demographic changes. The Army reports a 304 percent increase in the number of women in their service from 1973-89.(110:1) All three services predict that through the 1990s they will have an increasing number of women and minorities.(78:--; 163:9; 10:3) The Army and Navy also predict that women will move to higher levels of responsibility in the future.(78:--; 110:17) In fact, Navy figures show that the percent of female officers rose from 8 percent in 1980 to 10 percent in 1987.(78:--) The Army predicts that the number of female field grade officers will increase 28 percent by 1994, and more than triple by 1999.(110:10) In addition, the number of female Army generals

is expected to also more than triple during this same period, while the number of female senior civil service employees in grades GM 13-15 should almost triple.(110:11) Air Force statistics for officers validate this trend.(81:--) The Army reports that they expect minorities to become 27 percent of the 1999 active duty Army, an increase of 2 percent from 1989.(110:12)

Air War College Demographics

The data used for the following conclusions came largely from the actual statistical summaries computed by ACSC and AWC. Generally, the data shown is for US members of the classes. Other published statistics may deviate slightly from the data shown here. However, those other comparisons may be based on only the Air Force students or the class as a whole. Except where noted, data in this section came from AWC and ACSC student profile statistics sheets, and were validated by statistics found in the Air University Strategic Planning Trend Data, published in March 1988.(9:--; 165:--; 164:--)

The average age of the AWC student will increase slightly in the 1990s. AWC statistics from 1985-89 show the average class age as 41.5. ACSC statistics show the average age increasing steadily from 35.6 in 1980 to 36.7 in 1986. The ages for the 1987-90 classes were 36.2, 36.6, 37.0 and 37.1, respectively.

The average amount of time in service will increase. AWC data from 1985-89 shows every class having 18 years time

in service, on average. However, ACSC data shows that the average time in service fluctuated up and down 5 times in the last 10 years. The latest information, however, shows a steady increase from 1986, when the time in service was 12.0 years, to an average of 12.8 in 1990.

The large majority of AWC students will be married.

Both ACSC and AWC information shows a consistent trend that about 90 percent of the students are married. Statistics are not kept about second marriages, stepchildren responsibilities in and out of the student's household, or other important aspects of blended families.

The number of women in future AWC classes will increase. Past information about AWC classes shows the number of women in the class doubled from 1985 to the present. ACSC reflects a pattern of increases also. For ACSC, there were only five women in the 1980 class of 547, and only six in the next class. By 1987 the number rose to 17 in a class of 563, and by 1990 there were 45. As a counterpoint, the number of female Air Force lieutenant colonels dropped from four percent of the lieutenant colonel population in September 1985, to three percent in September 1987. The 3 percent figure remained the same from 1985 to 1989. The female Air Force colonel population remained two percent during this same 1985-89 period.(81:--)

There will be a slight increase in the number of blacks in future classes. While statistics for AWC show

increases, the numbers are too small to be decisive (two to five from 1985 to 1990). Statistics for ACSC show a steady increase from 6 in 1981 to 24 in 1990. Numbers of other minorities are too small for comparison.

The education level of AWC students may decline in the future. AWC statistics clearly show the vast majority of students with masters degrees, and almost all with at least a bachelors degree. ACSC classes show the same trends. While only 73.3 percent of ACSC students had masters degrees in the 1980 class, the percent rose to 74.4 percent in 1985. It leveled off in the last three years, however, and remains at about 77-80 percent today. The AWC statistics from 1986 show a decrease in those with masters degrees or higher. The 1986 figure was about 95 percent, while the percentages for the 1987-90 classes steadily declined to about 88 percent in 1988 and 1990.

There will be a greater percentage of lieutenant colonels in the class. ACSC statistics show some increase in the percent of the class that were majors versus captains. The 1980 percentage was 76.8 percent and rose to 94.2 percent in 1986. From 1988-90, the classes were composed of 92, 95, and 95 percent majors, respectively. The AWC statistics show a continuous rise in the percent of lieutenant colonels who attended the school from 1985 (77 percent) to 1989 (91 percent), while there was a corresponding decrease in the percent of colonels.

There will probably be a decrease in the number of AWC students with below-the-zone promotions. This prediction is based on the previous trends. If the average service date for AWC stays the same, and the age goes up while the number of colonels goes down, there probably will be fewer students who were promoted below-the-zone during their career.

There will be more officers from other US services attending AWC. The 1989 Congressional Panel on Military Education recommended that by school year 1989-90 the service war colleges should have 10 percent of the students from each of the non-host services. The panel recommended that this percent increase to 25 percent from each sister service by academic year 1995-96.(13C:128) The US military officers (active duty and reserve) in the 1980 AWC class consist of 8 percent from the sea service component (Navy, Marine, and Coast Guard), and 10 percent from the Army.

In the future, more AWC students will have had joint tours between their 12th year of service and their attendance at AWC. In addition to the DOD Reorganization Act requirements for joint duty, the ACSC statistics show trends in this direction. Though data is not available after 1985, the percent of ACSC students that had joint tours within six years of graduation was 1 percent for the class of 1982, but jumped to 11 percent in 1985. During this same four-year period, the percent of ACSC graduates that had assignments to wing level and below increased from 41 percent to 58 percent.

The trend was downward for air staff tours (20 percent to 12 percent).

A larger percent of future AWC classes will be nonrated officers. AWC data clearly shows this trend from the early 1980s. This phenomenon is interesting when compared to ACSC statistics. From 1980-82 the rated officer percentage rose from 48.4 to 57.0 percent. Beginning in 1983 the percentage began to drop. Except for increases in the 1987 and 1988 classes, there is a steady decrease. The 1988-90 class statistics show rated student percentages of 46.4, 45.0, and 40.9 respectively.

The future AWC class will have only an occasional student who has seen actual combat. This is the case now at AWC. At ACSC, the number of students with combat experience has been declining through the 1980s until there were virtually no students that had seen combat from 1986 forward. Foreign officers and those few who saw action in small conflicts such as 1989's Operation Just Cause in Panama will be the exceptions.

Demographic trends must be coupled with social changes expected in the future to form a complete image of the human aspect of the future environment. The next chapter addresses those social changes.

CHAPTER VIII

THE SOCIAL FABRIC

The social fabric involves the way people live. It includes their family composition, lifestyle, beliefs, and values.

In the future, there will be more nontraditional families and blended families where there are stepchildren involved. Families will be less stable and more fragile. (120:1; 101:24; 68:5; 26:66) In 1970, 70 percent of the work force had families with children, a husband who worked outside the home, and a wife who stayed home with the children. By the end of the 1980s, the number of these "traditional families" dropped to just 15 percent.(24:25) In the future, there will be more people living in "sharing arrangements" who are not married.(187:17) A New York court and the California Task Force on the Future of the Family recently established special definitions for families that included criteria based on attributes other than marriage. Figure 28 shows those definitions.

There will be many more single parents in the 1990s than in the previous decade.(68:5; 187:17; 112:5; 24:26:

1988 New York Court Definition of Family

Four standards govern the definition of a family:

1. Exclusivity and longevity in a relationship
2. Level of emotional and financial commitment
3. How the couple conducts their everyday lives
and holds themselves out to society
4. Reliance placed upon one another for daily
services

Definition of Families by the California Task Force on the Future of Families

The family is defined as having the following functions:

1. Maintain physical safety and health
2. Help shape goals and values
3. Teach social skills
4. Create a place to recuperate from stress

Figure 28: Definitions of Families(70:18)

59:35-36) In 1960, 10.7 percent of the US families had single heads of household. In 1986 the number rose to 14.3 percent.(47:39) There are more children being born to unwed mothers than in the past.(121:2)(24:26) Over 20 percent of all children born in 1989 are to unwed mothers, and a third of those are to teenagers.(70:16) In 1964, 10 percent of college graduates came from single parent homes. In 1981, the rate doubled to 20 percent.(117:89)

There is an increase in single parents in the Air Force for female lieutenant colonels and colonels. There were 16 single female lieutenant colonels with children at home in 1985. The number rose to 17 in 1987, and 30 by 1989. There were only two single female colonels with children in 1985 and eight in 1989. The number of single male lieutenant colonels and colonels for this period actually went down--120 and 110 respectively for lieutenant colonels, and 50 and 33 for colonels.(81:--)

For all Air Force officers, the number of single female parents with children in their home almost doubled from 1981 to 1988, and stood at 522 in 1988. There were 665 single male officers with children in their home in 1981, and 603 in 1988.(163:20) The Navy reports an increase in the number of single parents in the Navy and Marines through the 1980s (12,773 in 1988). Most of the single parents were male, with the Marine Corps reporting that 80 percent of their single parents were males.(78:--)

There will be a high divorce rate in the future.

(70:17; 59:35) In the next 10 years, over 50 percent of first marriages today will end in divorce.(121:4; 117:89) For women now in their 30s, the prediction is a 56 percent rate. The divorce rate in 1989 was twice that in 1965. For those who marry a second time in 1989, the divorce rate is expected to be 60 percent.(70:16) American couples are also divorcing at earlier ages.(121:4; 25:26) As a counterpoint, one report predicts that divorce numbers may actually decline because couples are marrying at older ages, they fear AIDS, and the overall marriage rate is smaller.(47:39)

There will be more dual income families in the future.(121:2; 26:66) Today, 67 percent of married couples are two-earner families. Another study puts the current number at 52 percent. Authors in both studies indicate the number will rise in the next 10 years.(47:35-36; 112:5)

Children will have less contact time with parents, and child care will be an increasingly serious problem.(79:cptr 10, pg. 15) In 1982, 19 percent of mothers worked full time. The figure rose to 30 percent by 1985.(121:8) Today, nearly 60 percent of mothers with preschoolers are either employed or are looking for work. By 1995, the figure will rise to 67 percent.(121:7) While mom works, most children will stay either in their own or someone else's home.(69:87)

In the 1990s, employers will provide more and more child care assistance to employees.(179:109; 70:20; 47:35)

IBM started a new leave policy in 1988 that allowed employees to take up to three-years leave for maternity or other valid reasons, with a guaranteed right to return to work.(169:1) In 1989, AT&T signed an employee union agreement that set aside five million dollars as "seed money" for employees to develop child care and elder care centers. The agreement also increased maternity leave from six months to a year for fathers or mothers. Further, the company established a system so employees could receive up to five thousand dollars tax free for child care or similar needs.(168:A9)

The total child care requirement includes care for infants, sick children, times when children are out of school or are dismissed early from school, and care to transport children to football practice or music lessons while parents work.(79:cptr 10 pg. 15) A 1988 survey of 4,000 Dupont workers showed that over half of those with children under 13 were having child care problems.(129:C5) The Department of Labor reports that "full spectrum" child care is becoming a critical capability for companies who want to hire and keep good workers.(79:cptr 10, pg. 15) The federal government, through the General Services Administration (GSA), has begun helping those with GSA-managed work space to establish child care activities.(84:45)

Children can expect harder childhoods in the future.(26:66) In 1955, 400,000 children came from divorced homes. In 1985, the number was 1.1 million.(101:27) One third

of children born in the 1980s will live in a stepfamily before they become 18 years old. Today, 25 percent of US children are raised by a single parent.(70:16) Of the children born in 1988, 70 percent of white and 94 percent of black children can expect to live in a single parent family for some part of their life.(122:--; 121:2) Half of the black and 15 percent of the white children in the next 10 years will live in fatherless homes. In fact, black youth will spend an average of 60 percent of their childhood with one parent (an increase from 22 percent in 1970), and white children 30 percent (up from 8 percent in 1970).(24:26)

The Congressional Research Service reports that more children will live in poverty in the future because more will live in single parent homes.(121:8) Today, about 20 percent of America's children live in poverty, with the percent twice that average for black children.(70:16) Of the 33 million poor in America in 1989, 13 million of them are children. Half of the homeless in New York City are children. These children are, on average, six years old. (106:49, 52) Stepchildren tend to have more emotional and developmental problems, and are more likely to be abused.(101:27)

The need to care for the elderly will increase in the next ten years.(79:cptr 10 pg. 16; 24:24) By the turn of the century, baby boomers will be caring for both their children and their parents.(21:63) People are living longer. Since 1900, every generation lives about three years longer than the

last.(112:39) By 2005, there will be 100 middle aged people for every 114 people over 65.(21:63) By 2000, the population 85 and older will have quadrupled from the previous 40 years. (21:66) Today, 60 percent of Americans must arrange for elder care for someone in their family. By 1995, that number will rise to 80 percent.(121:10) The demand for elder care will be so great in the future that 220 new nursing home beds will have to be created every day from 1980 to 2000 to keep pace with demand.(21:66)

People will be healthier in the future, but AIDS will continue to plague society. Longer life expectancy is the best indicator of a healthy future.(17:7; 112:39; 121:10) There will be a continued emphasis on a healthy lifestyle. (47:38) There will be a wider variety of health foods available in the future, many of which will be developed using future technology.(79:cptr 10 pg. 2; 117:88; 97:61) In the next decade, health technology will include tissue compatible biomaterials, better artificial limbs, 100 percent effective contraceptive pills, shots with no side effects, and chemical control of high blood pressure.(15:111, 137-139; 97:61) Emphasis in the 1990s will be on promoting wellness rather than curing illness.(141:13) The GSA now has a program where federal agencies using their buildings may create physical fitness facilities for their employees.(84:45) An Air Force report shows that 53 percent of the diagnoses made in their hospitals are lifestyle related, and could have been prevented

by a healthier lifestyle.(163:20) The "managed health care" revolution will continue in the 1990s. Use of health maintenance organizations (HMOs) and "preferred- provider organizations" will increase from less than 5 percent in 1980, to 28 percent in 1989, to possibly 65 percent by 1997.(69:68).

In 1988, the World Health Organization reported that 143 nations had one or more cases of AIDS. By December 1988 there were over 130,000 reported cases of AIDS. By the end of 1991, there could well be 270,000-400,000 new cases. Figure 29 shows the worldwide AIDS situation as of January 1989.

(178:17-18; 163:26) State legislatures considered over 550 AIDS related bills in 1987 alone. About a fifth of the bills introduced from 1986-88 involved mandatory testing.(116:19-20) In their April 1988 report, the US government's special Working Group on the Future Security Environment that included Drs Henry Kissinger and Zbigniew Brzezinski, four retired general officers, and other prominent people, discussed the importance of AIDS as a catalyst that may cause threats to US national security.(162:11)

The 1990s will see the disintegration of America's middle class. One author calls this development the most significant sociological development in the future for the US. There are more nontraditional families, and new political blocks like the elderly, women, and certain minorities are forming that do not relate to income.(24:28) Women will have

<u>Continent</u>	<u>Cases</u>	<u>Countries with One or More Cases</u>
Africa	20,905	46
Americas	93,723 *	42
Asia	285	22
Europe	16,823	28
Oceania	1,180	5
Total	132,976	143

* Approximately 85 percent are in the US (80,538)

Figure 29: AIDS Cases Reported as of January 1989(178:18)

more political power in the future and will hold more senior jobs.(47:38; 179:109)

The number of middle income families (those making \$50,000 annually) declined from 18.3 percent in 1970 to 13 percent in 1985.(83:30) In 1990, there is the largest "gulf in income between rich and poor American families . . . [than] at any time since figures started being recorded in the 1940s." The richest 20 percent of the families get 44 percent of the national family income, while the poorest 20 percent get 4.6 percent.(106:48)

Regional and ethnic issues may create political blocks. For instance, one source predicts that the majority of people living in California and Texas may be hispanic by 2010.(24:24) Further, with the rise of the hispanic population, there will be a much larger portion of the US population that speaks English as a second language.(187:17)

People will travel much more in the 1990s.(24:13)
Better roads, more accommodations, and more discretionary money will cause Americans to travel more in the future. Air travel increased 5 percent annually from 1981-85, and will double from the 1985 rate by 2001.(47:30) People will travel more to change jobs or train for them.(47:31; 135:4) Modern technological advances in transportation will let workers commute longer distances in the future. There will be satellite population centers around large cities. There are

currently 14 such satellites around Washington DC.(125:--:
187:18; 24:21)

The lifestyle of the 1990s will be immersed in technology. By 2000, 70 percent of American households will have a computer.(26:67) Houses built in the 1990s will have built-in electronic intelligence to adjust the environment, conduct security, turn on and off appliances and do a myriad of other tasks. By 2000, the National Association of Homebuilders estimates that its associates will have constructed some 1.5 million of these homes.(51:1, 11)

In the next decade, 100 million families will subscribe to cable television, and two-way interactive cable television will be available to over half of them by 2000.(112:5) Before the next century, 85 percent of American homes will have VCRs.(60:47) High resolution television with more than twice as many lines per screen as today (1125 or more versus 525 today) will be available in the 1990s. The Japanese already plan to upgrade their television system in the early 1990s.(114:--; 97:67) Some, including Timothy Willard, Director of Communications for the World Future Society, predict holograph television and movies by the late 1990s. (97:67; 111:B1)

Entertainment will be accommodated by "theaters" in the home with special lights and satellite hookup. More homes will have large master baths and areas for fitness equipment in the next 10 years. More electronic shopping from home, and

the creation of "electronic malls where customers shop by computer at these electronic kiosks, are waiting in the 1990s.(79:cptr 10 pp. 7-8)

Life in the 1990s will be different from that in the 1980s, largely because of technology. Technology and the social changes anticipated will not only affect our personal lives. They will also affect the workplace. The next chapter addresses those changes.

CHAPTER IX

THE WORKPLACE

Insights into the workplace include the work environment, job turbulence, and attitudes that affect the worker and the work produced. The last trend discussed, changes in attitudes, cuts across the social and work environments. It is included in this chapter rather than the previous one because of the serious implications to employers.

In the future, more work will be done away from the traditional workplace. (61:20)(24:12)(103:28-32) More work will be done at home in the 1990s than in the previous decade. (47:35)(179:111)(23:22) One estimate is that the number of people who work at home will increase from 12 million in 1980 to 56 million by 2000. (26:67) Up to 30 percent of the labor force will work at "off-site" locations by 2000. (98:2) Approximately 450 companies now have telecommunications systems that allow over 100,000 workers to work at home or at remote sites. (23:22) High technology transport and future electronics will let workers be physically farther away from the workplace while doing their jobs. (125:--) One researcher explains that in the future we

will "see a change of extraordinary historical and sociological importance-the change in the nature of markets from 'places' to 'networks.'"(24:12)

The workplace in the 1990s will be more automated and will incorporate more high technology. (47:36; 23:22; 110:2; 163:8) In the 1990s, over 75 percent of the federal work force will use computers.(84:44) Technology will be in every facet of the office, from microcomputers to a complete communications networking system.(135:3) "Shared and expert systems will replace many of the administrative processes and manual systems that exist today."(179:109) The Army plans to replace low skill workers with technological substitutes. (110:6; 83:15)

People will change jobs and careers frequently in the future.(23:20, 22; 46:14; 52:--; 31:--) Jeffrey Hallett, a job trend analyst, predicts that by the turn of the century, the typical American worker will have changed jobs four times and will probably work in a profession that does not exist today. He explains that by 2008, 80 percent of the jobs today will not exist.(98:1) A 1986 poll showed that only 39 percent of American workers expected to have their same job in 1991. Through the 1990s, while people will change jobs frequently, they will have at least one career change during the upcoming decade.(47:35) One report predicts that "workers' jobs will change dramatically every 5 to 10 years."(46:14)

The education level needed for workers in the future will be higher than it is today.(135:4; 68:12; 47:33) One report concludes that there will be a much greater demand for workers with at least a bachelors degree.(31:--) Another wrote that by the end of the century, one year of college would replace a high school diploma as the basic level of education for work.(31:--) The Air Force also sees that "technical skills will underlie almost all Air Force civilian jobs in the future."(135:4) Half of the future jobs in the Air Force during the 1990s will require a "high school plus" education and a third will require college education.(163:15)

Future workers will need much more frequent education and training to keep up with the pace of change. They will also need frequent retraining to transition into new jobs.(46:14; 88:29-30; 47:33; 163:18; 23:23) By 2000, three-fourths of American industrial workers now working will need to be retrained.(83:9) In the 1990s, workers will need retraining every 5 to 10 years.(152:145; 26:67) Business may spend over 10 percent of its payroll to retrain employees by 1995.(23:22) The American Society for Training and Development states that employers already spend \$30-40 billion each year to educate and train employees.(143:268) Another study indicates the amount is \$80 billion, and that it will double by 2000.(47:33)

The existing and near-term future workforce does not have the education or training to meet future job requirements.(89:D1; 163:17) In Chicago in 1989, 5,700 children in 190 classrooms go to school but have no teacher. In 1989, 30 percent of the school-age youth dropped out of high school. The figure is 40 percent for minorities.(106:48) A 1984 study showed that 43 percent of college students who attended a four-year college failed at least one course, and 30 percent took special courses to improve reading, study and other basic skills. A sociology professor at the University of California at Berkeley said in 1989: "A third of my students are illiterate, . . . unable to understand a complex sentence or write one that makes sense."(184:60) The military reports that recruits have lower educational abilities than in the past.(47:36) There will probably be a shortage of scientifically literate workers in the 1990s.(117:57) Most college graduates in the 1990s will find an "ever widening gap between what they understand and what they need to understand," because of technological change.(117:44)

Conflicting information exists on changes in the retirement age, and whether or not older workers will stay in the work force longer. In the early 1900s, 67 percent of the men age 65 and older stayed in the workforce. The average retirement age in the 1940s was 69. By 1989, workers were retiring at an average age of 62.(21:68) Other reports noted a trend toward earlier retirement.(187:18; 68:5) One showed

that in 1963, 20 percent of working men retired by age 62. By 1988, the number was 49 percent. There is an increasing number of companies that pay pensions at an earlier age than in the past.(171:53)

As a counterpoint, one study predicts that the mandatory retirement age will be 70 by 2000, and another said the military retirement age will rise in the future.(47:35; 16:10). Other sources corroborate this position by saying that "in the years ahead, people will work to an older age," and will stay in the workforce longer than in the past. (179:103; 117:89) In fact, the food industry today is tapping older workers to become part of their labor force."(79:cptr 10 pg. 6)

The average time spent on the job will decrease, but opinions differ on whether there will be more or less leisure time. By 2000, the average work week will likely be 25-32 hours, with maybe six or seven weeks of vacation a year. In fact, many workers will opt for time off in lieu of raises.(16:12; 23:22; 47:33) Trends in other developed countries are the same, with Sweden now having a 36 hour workweek. Germany's workweek is 37 hours and is expected to drop to 35.(47:37)

One report cited a survey that showed people had less leisure time from 1973, when 26.6 percent of their time each week was devoted to leisure activities, to 1988, when the percentage dropped significantly to 16.6 percent.(122:--).

Some sources believe that the shorter work week will be filled by workers training for their next job, so leisure time may not increase.(47:33) Others believe that leisure time will be consumed by household chores because there will be more two-income families.(112:5) On the other hand, a substantial number of researchers report that people will have more leisure time. However, none of these sources provided any statistics or other hard evidence to substantiate their claim except for predicting a shorter workweek.(68:10; 47:37, 39; 60:47)

In the next 10 years, the large majority of jobs will be in the service, executive and professional, and high tech areas, with many of the service jobs relating to the information/knowledge industries.(31:--; 47:38; 135:4; 98:2; 47:31, 33; 117:44; 125:--; 99:xiv) Service workers composed 72.2 percent of the work force in 1984. By 1995, the share is expected to increase to 74.4 percent, and by 2000 to be 88 percent.(47:34) By 2000, about half of the service workers will collect, analyze, synthesize, structure, store, or retrieve information, and will almost totally replace manual and clerical workers.(47:30,37) Secretaries will essentially disappear by 2008.(98:2) General Motors reports that in 1988 their ratio of manual to technically skilled workers was 5.6:1. They expect that ratio to be 1:1 by 1995.(163:16)

"The typical large business in 2000 will be information-based, composed of specialists who guide

themselves based on information from colleagues, customers, and headquarters."(47:36) One study reports that by 2000, up to 80 percent of all workers in the US will be in the information industry, and by 1995, 80 percent of all managers will be knowledge workers.(23:20)(47:30) Five of the 10 fastest growing careers in the 1990s will be computer related. The demand for computer programmers and systems analysts will increase 70 percent.(47:35) There will be fewer jobs in manufacturing, mining, and farming through the 1990s.(31:--; 47:34) In 1984, the number of technical jobs was 17 million. By 1990, it will probably be 20 million, and by 1995 the number may jump to 23.5 million, with an increase to 26 million by the end of the century.(163:17)

Through the 1990s, the federal government will hire more employees with professional and managerial skills, more technicians, more social and biological scientists, more medical care professionals, and more legal and business-trained people. They will reduce hiring for blue-collar workers and supply specialists.(50:A5)

The work environment in the next decade will be more participatory, with more decentralized and task force decision making, and with fewer people and less middle management.

(52:--; 98:2; 88:30; 68:5, 6; 23:20; 47:37; 156:41) One business executive explains that in the 1990s,

. . . we'll be at the point of information overload, and it will take discerning individuals to figure out what is important, what they should use, and

how they can understand it. . . . We've got to prepare people with conceptual skills.(156:59)

Individuals in the future must have broad, conceptual interdisciplinary skills.(68:12) Management in the 1990s will change the workplace from one of "homogeneity to heterogeneity," and from "dependence and affiliation to independence and empowerment."(163:29)

Walter Hahn, a renowned futurist, agrees with other researchers who believe that future organizational structures will continue the current trend of becoming "flatter" with fewer middle managers.(88:29; 23:22) By early in the 21st century, the typical business may have only half the management layers of today and only a third the number of managers.(79:cptr IV pg. 12) Teamwork, teambuilding, and participatory management will be much more commonplace in the future.(47:34, 37; 156:59; 163:6) One result of smaller and flatter organizations of the future will be fewer promotions, because there will be fewer "rungs on the corporate ladder."(137:--)

There will be more part time workers.(70:20; 179:109; 135:4)

Unemployment will shift and be located in moving pockets as jobs and industries change.(15:77) Where industries change and workers cannot keep up with the skills needed, or where industries move to new locations to find workers with new skills they demand, there may be "knots of unemployment."(24:10)

Attitudes about life, work and self will change in the 1990s. Individualism will be the driving factor in behavior.(141:13; 160:21; 47:37; 68:5; 73:20) The 1990s will be the decade of conservatism.(68:5; 16:9; 88:30) Figure 30 shows the partial results of a Gallup poll taken in 1984 of 1,346 key leaders in America on their ideas of the five most serious problems facing the US in that year and what they believe they would be in 2000.(80:159-161)

The 1989 college class' attitude about life was to look out for themselves.(137:--) A poll taken in 1989 of 250,000 college freshmen, showed that they defined their life goals as "being well-off financially." They defined themselves according to external things--money, power, status. This conclusion differed considerably from a similar poll taken in 1970, when the life goal of freshmen was "developing a meaningful philosophy to life."(184:60) It also differed from a 1982 poll of college graduates who emphasized career and many of the more traditional American values.(117:89) Changes are taking place in traditional values that were part of American society from the early 1900s. Figure 31 shows these changes.(141:10)

Employers do not want to be committed to employees today. There are few ties between employer and employee, and less loyalty.(137:2; 68:5; 47:35; 163:29) Americans are becoming more sophisticated and discriminating in what they will accept, and more demanding in products and services.

<u>PROBLEM</u>	<u>PERCENT RESPONSES</u>	<u>1984 RANKING</u>	<u>PERCENT RESPONSES</u>	<u>2000 RANKING</u>
THREAT OF NUC WAR	65	1	52	1
CRIME	61	2	35	3
INFLATION	38	3	15	7
UNEMPLOYMENT	36	4	14	10
ENVIRONMENT	27	5	34	4
EDUCATION	21	8	19	6
OVERPOPULATION	16	11	38	2
DRUG ADDICTION	12	13	7	19
ECOLOGICAL PROBLEMS	12	15	21	5
NARCOTICS TRAFFICING	11	16	5	22
TERRORISM	11	17	14	9
ABORTION	1	31	2	33
INADEQUATE HOUSING	5	22	9	15
HEALTH CARE DELIVERY	5	26	8	18
ALCOHOLISM	7	19	4	26

Figure 30: Results of a 1984 Gallup Poll of US Leaders on Their Beliefs About the Five Most Serious Problems in 1984 and What They Believed Would be the Five Biggest in 2000(80:159-161)

TRADITIONAL VALUES

SELF-DENIAL ETHIC

HIGHER STANDARD OF LIVING

TRADITIONAL SEX ROLES

ACCEPTED DEFINITION OF SUCCESS

TRADITIONAL FAMILY LIFE

FAITH IN INDUSTRY AND
INSTITUTIONS

LIVE TO WORK

HERO WORSHIP

EXPANSIONISM

PATRIOTISM

UNPARALLED GROWTH

INDUSTRIAL GROWTH

RECEPTIVITY TO TECHNOLOGY

NEW VALUES

SELF-FULFILLMENT ETHIC

BETTER QUALITY OF LIFE

BLURRING OF SEX ROLES

INDIVIDUALIZED DEFINITION
OF SUCCESS

ALTERNATIVE FAMILIES

SELF RELIANCE

WORK TO LIVE

LOVE OF IDEAS

PLURALISM

LESS NATIONALISTIC

GROWING SENSE OF LIMITS

INFORMATION/SERVICE
GROWTH

TECHNOLOGY ORIENTATION

Figure 31: Change in the 1990s from Traditional Values Found in
the First Three Quarters of the 20th Century(141:10)

(79:cptr 10, pg. 1; 122:--) Americans in the future will want higher ethical standards from employers, politicians, and advertising.(141:13)

Workers will be much more sensitive to their personal and family needs, and their desire for fulfilling and challenging work in the 1990s. They will place these considerations ahead of careers in many cases.(70:18; 129:C5; 68:5; 61:20; 78:--) As IBM reported their latest union agreement in 1988, Jesse Henderson, Director of Personnel and Administration for the IBM Systems and Integration Division, said that "as you look at the changing demographics, companies will have to respond to that to be competitive. They're going to have to have flexibility." The IBM agreement allowed more flextime, and a new work-at-home policy.(169:1,14) Some 29 percent of US businesses now have some form of flextime. Over 40 percent of US managers believe that the percent will increase in the future.(160:21)

The previous few chapters have incorporated the importance of technology to the future. The next chapter provides a detailed look at technology, and its impact in the next 10 years.

CHAPTER X

TECHNOLOGY IN THE 1990S

There has been more technological change since World War II than has occurred since the beginning of recorded history.(152:6) Society is at the point where it takes longer for manufacturers to use an existing technology than to develop a new technology to replace it.(117:72) In the next 10 years, there will be 10 times the number of innovations as there were in the previous decade.(97:53; 150:78) A drug manufacturer executive explained that the industry "used to have one major advance every 25 years; now there's one every 24 hours. If it works, it's obsolete." These observations lead to the fundamental conclusion about technology in the 1990s: technology will change very fast--"the pace will be spectacular!"(125:--; 135:3)

This chapter focuses primarily on the probable technologies that will be introduced and used in the 1990s, rather than on trends applicable to technology as a whole. This approach provides more specific information about the impact of technology on the future than describing general

technological trends. Because there is so much information about future technology, only the most important technologies that may be useful to AWC are presented.

Facilities

"Smart House" technology will become common by the end of the decade. (79:cptr IV pp. 7-8, cptr XI pp. 11-12; 125:--; 153:40) Smart house technology uses computers to detect human activity, turn on lights and appliances, control temperature and ventilation, and provide security through sensors. By 2000, half of all new homes built will be computerized (i.e. "smart houses"). The book, Future Stuff, explains that the odds are 90 percent that extensive use of smart house technology will be available in the 1990s. Their prediction is that this home computerization can monitor the temperature of each room in the house and adjust it accordingly, take advantage of lower utility rates as it starts washing machines and dishwashers during the day, monitor the house for safety, and allow management of the entire system by a voice recognition system. (3:4-5)

Fully integrated wiring (architronics) that allows one wiring system for phones and electricity will be in use in the 1990s. (79:cptr IV pg. 7)

Modular facilities will become more common in the 1990s. In the future, walls in recreation areas will be able to be changed to reflect different moods or desired atmospheres. (79 chptr IV pg 6) Bathroom and kitchen "pop-in

modules" will be available.(79:cptr IV pg. 8) Some builders are thinking of "clip-on walls" for buildings.(51:11) A new high school built in 1988 in Gaithersburg, Maryland, uses modular classrooms that can be rearranged into different building configurations, or moved to different schools, if needed.(85:A1)

Air Force Technology

The Air Force Systems Command's Air Force Science and Technology and Development Planning Program describes many technologies being pursued by the Air Force. It shows them in a number of arrays, including two that are useful for this study. First are those technologies for which the Air Force is expending great effort, because they expect big pay-off ("high-leverage").(5:6-7) The second list includes those technologies classified as "Major Technology Thrusts." (5:21-24) In addition, the Air Force Engineering and Services Future Vision study on the future to 2010, published key information about future Air Force technologies from a 1989 Air Force Systems Command briefing entitled "Visions and Accomplishments."(79:cptr VII pp. 4-6) Figure 32 shows a merged list of these three sources. Technologies on one list often appear on one of the others.(5:--)

The Air Force does not provide a time line for developing these technologies in this unclassified document. Other sources can give insight into the use of these technologies and in some cases when they may be fielded.

Photonics
 Directed Energy (2007-2012)
 Super Property Materials (High
 Temperature/Lightweight/Super Strength/ High
 Density/Etc) (1993-forward)
 Non-Linear Optics
 High-Energy Density Propellants
 High Performance Turbine Engines and Advanced Propulsion
 Systems (1992-forward)
 Smart Skins (1998-2001)
 Knowledge-Based Systems
 Brilliant Weapons (1998)
 Robotics
 Super Cockpit (1995)
 Vertical/Short Take-off and Landing
 Computerized Battle Management
 Target Recognition/Acquisition/Warning Systems
 Communications/Navigation
 Artificial Intelligence
 Air Base Systems (Fire Protection, Utilities, Noise,
 Environmental Quality, Pavements, Facilities)
 Advanced Munitions Guidance and Performance
 Space Power, Propulsion, and Similar Technologies
 Nuclear Technology (for engines 2013)
 Energy Projection (Lasers, Microwaves, High Energy
 Plasma Physics)
 Life Sciences
 Physics
 Computers
 Superconductivity
 Molecular Kinetics

Figure 32: Major Air Force Technologies Under Development and
 Projected Completion of Development for Some
 Technologies(5:6-7, 21-24; 6:--)

A 1987 Systems Command work paper shows approximate time lines for developing certain technologies.(6:--) Data from this paper is incorporated into the list of technologies shown in figure 32, where it is applicable.

Other sources add information to the technologies expected to emerge in the 1990s. According to James Petty, manager of the Air Force's Integrated High Performance Turbine Engine Technology program for Aeronautical System Division's Wright Research and Development Center, "engines for fighters may be able to operate at three times the speed of sound, or can increase the plane's range, loiter time, or payload by 100 percent."(76:24)

A 1987 article in Aviation Week shows time lines for some technologies. For instance, the article explains that System Command's schedule calls for laser arming and firing devices in 1991, optical radar/radio in 1994, a head-aimed fire control system in 1989, an all-aspect heads-up display for the advanced tactical fighter in 1991, and an artificial intelligence cockpit in 1996.(123:139-140)

An article in the September 1988 issue of Defense and Diplomacy discusses the possibility of chemical, anti-proton, and nuclear fuel for flight.(57:9) General Lawrence Skantze, former commander of Systems Command, said in 1986 that "we can now produce a nuclear propulsion system that is safe and compact, . . . [and] may produce a 50,000-pound thrust engine about the size of an oil barrel."(57:10) The article explains

the probability of 200 nautical mile air-to-air missiles in the fairly near future, and 500 nautical missiles beyond that.(57:11)

"The current stealth technology will form a baseline, and will undoubtedly be considered for incorporation into all future military aerospace vehicles," according to the article. Follow-on stealth will use "new illusionary electronics technologies."(57:11)

Air Force Magazine reported in January of 1988 that the Air Force was developing voice-controlled avionics that allows the aircraft to "know" what the pilot says when he uses one or more of 656 unique words.(90:88, 92)

The Defense Department sent a list of 22 technologies critical to the military to Congress in 1989. Figure 33 shows those technologies.

Transportation

Automobiles will have "smart systems" on them in the 1990s, particularly navigation systems.(97:63; 153:39) Future cars will be able to tell the driver where he is, and the best routes to take to arrive at his destination, given the road and traffic conditions. These systems will also tell the driver where the service areas, hospitals, and shopping are located. Later innovations will include collision avoidance systems.(75:30) Battelle Memorial Institute is experimenting with such a system now.(182:43) The navigation will be possible by using the Navstar Global Positioning System

1. Microelectronic Circuits and their Fabrication
2. Preparation of Gallium Arsenide and other Compound Semiconductors
3. Software Production
4. Parallel Computer Architectures
5. Machine Intelligence/Robotics
6. Simulation and Modelling
7. Integrated Optics
8. Fiber Optics
9. Sensitive Radars
10. Passive Sensors
11. Autonomous Target Recognition
12. Phased Arrays
13. Data Fusion
14. Signature Control
15. Computational Fluid Dynamics
16. Air Breathing Propulsion
17. High Power Microwaves
18. Pulsed Power
19. Hypervelocity Projectiles
20. High-Temperature/High-Strength/Lightweight Composite Materials
21. Biotechnology Materials and Processing

Figure 33: Department of Defense Critical Technologies(79:cptr VII pp. 2-3)

satellite that is expected to be completed in the early 1990s.(75:31; 182:43) The Japanese developed and distributed a computer disc system of navigation in 1987 for sales in Japan. The discs are for local or regional areas and show where the car is and preferred routes. Over 40,000 units were sold in 1988 on the Toyota Crown automobile.(75:33). Sensors will control suspension and braking systems on the cars of the 1990s.(182:42) The Nissan Maxima has a "drowsiness-warning system" that recognizes driver fatigue.(153:39)

In the mid to late 1990s, there will be 600-passenger subsonic aircraft, supersonic transports, short/vertical takeoff and landing craft, and large transport/cargo rotocraft flying in America's skies.(39:27; 149:H5) The Federal Aeronautics Administration predicts that by 2000, rotorcraft will increase by 77 percent. Further, major airlines will almost double their passenger load between 1987 and 2000.(39:270; 82:C3) Boeing is looking at how to accommodate the 747-500, an expanded version of the 747, with a wing span of perhaps 265 feet.(39:28)

There will be high speed trains in the 1990s for commuters and other travel.(155:1; 2:--; 42:748; 125:--; 47:31) Magnetically levitating (maglev) trains were developed 20 years ago, and reach speeds of 200 miles per hour. The concept uses magnetism's property that like magnetic poles repel each other, therefore the train rides above the rails. These trains began operation in Japan and France in the 1970s.

Florida is considering using a maglev system for train connections among Miami, Orlando, and Tampa. Eleven other states are considering this technology, including a link from Los Angeles to Las Vegas.(82:C3) The British announced that by 1993 they hope to have a high speed train running under the English Channel to the continent.(26:5)

Use of automation and robotics will increase significantly in the 1990s.(163:8; 177:3-112; 39:--; 24:11; 150:78; 17:7; 109:10, 22-23) Dr Hans Moravec, a computer scientist, explained in December 1989 that "PCs [personal computers] will grow arms, legs, and eyes in the next 10 years."(43:--) The Japanese recently developed the capability to use robots to build some parts of houses.(79:cptr IV pg. 9) In the late 1990s, robots will be sold that can do simple tasks like cook hamburgers, deliver medicine and meals to patients in hospitals, and feed invalids. There is already a "security robot" that can fire a weapon.(150:78) In the 1990s, robots will be available for dangerous jobs such as firefighting and medical evacuation, and mundane jobs such as window washing and routine household chores.(79:cptr XI pg. 12; 58:25; 2:--; 43:--; 108:23; 15:148) In 1988, the Air Force tested the use of robots in explosive ordinance disposal operations.(149:30) Indeed, in the mid 1980s, the Department of Defense and civilian industry joined forces to explore robotics for physical security and a host of mundane and dangerous jobs.(108:23) Robots are patrolling some US

prisons.(153:41) One estimate is that by 2000, robots will replace humans in more than 40-50 million jobs.(23:20) Another source predicts an annual growth in use of robotics of 30-49 percent annually.(108:20)

Information and Communications

Computers and satellites will revolutionize information management and communications in the 1990s, as the amount of information virtually explodes.(23:20; 38:H5; 15:117; 156:41; 2:--; 98:1; 117:44) "Paper is being supplanted by electronic pulses [in] offices and factories across the country." The "electronic data interchange" (EDI) is a high speed information system used by 3,500 companies in 1988. It is expected to expand to 10,500 "mostly large companies" by 1991.(36:F1) The US Treasury saved \$60 million in 1986 by electronic transfer of checks using this system. Douglas Aircraft Company saved five dollars per transaction on purchase orders, and the First National Bank of Chicago expects to save two million dollars annually with EDI. Both the US Postal Service and the Department of Defense are developing EDI systems.(36:F2)

In the future, ordinary people will have substantially increased access to vast amounts of information instantaneously. Chairman of The Diebold Group, Incorporated, said in 1988, that his company has a client that uses satellite communications to connect 50,000 vehicles. (63:139) A high school built in 1988 at Gaithersburg, Maryland, has a

two-way interactive video speaker system so guest speakers can have discussions with students while they stay in their classroom.(85:A1) By 2000, magazines will be on computer disks rather than printed on paper.(47:32) Other information and communications technologies of the 1990s include improved image processing like better video discs, increasing local area networks for communications, and fiber optics and other systems that allow communications by other than telephone lines.(60:46)

Telecommunications networks will allow businesses to have long distance meetings and training sessions.(179:111) By 2000, the Nippon Telegraph and Telephone Public Corporation expects to have 60,000 of Japan's modern office buildings equipped with teleconferencing capability.(117:46) Fiber optics for communications will be available to many people in the 1990s.(155:1; 157:9; 150:78; 97:68) Computers will understand natural language, allow translation of foreign language, and include videophone technology. (15:142; 97:68, 95) There will be widespread use of cellular phones in the 1990s.(15:147) Interactive cablevision will allow shopping and banking at home. It will be used to vote, file taxes, apply for auto tags, take tests, and a myriad of other tasks.(47:34-35; 15:147) Currently, taxpayers can file federal tax returns through computer systems.(148:2) We will see the "mature merging" of computers and telecommunications in the 1990s and into the early 21st century. Expert systems,

natural language communications, electronic mail, and interactive terminals will come of age.(24:11) By 2000, videodiscs will include audio, video, smell, taste and feel stimulations.(47:30) Very high speed and improved resolution datafaxing machines are in the very near future.(15:145) Computer systems will provide access to all card catalogs in libraries around the world before 2000.(47:30)

Television in the late 1990s will have "movie picture clarity and sound equal to that of compact discs."(114:1A) Japan recently introduced this technology in that country. By the mid 1990s the technology should be available in the US.(150:78)

Health and Biotechnology

There will be important improvements in foods and the genetic processes to produce those foods.(150:77-78; 15:132-133) Examples that will occur in the 1990s, include genetically bred potatoes and mayonaise processed from soybeans.(97:58) There will be tomatoes grown especially for certain recipes, and "analog" foods like pork chops developed from soybeans that look, taste and cook like the real thing.(79:cpter IV pg. 4) Techniques called "supercritical extraction" will remove 90 percent of the chlorestrol from foods like eggs and cream.(79:cpter IV pg. 3) Biotechnology in the 1990s will permit breeding superanimals that will concentrate on nutritious aspects of the food.(117:84; 150:77) Foods like celery and fruits will keep their freshness longer,

and foods will be produced that require less refrigeration.
(79:cptr IV pg. 4; 150:77)

There will be revolutionary advances in artificial replacements for the human anatomy and in technological medical procedures and processes in the 1990s. A January 1990 John Hopkins University study revealed that a small generator placed in the body to give shocks to heart patients dramatically reduced deaths among those with heart rhythm disorders.(62:4A) One report describes a future for medicine where the blind can be able to see, the deaf to hear, robots will be used for some surgery, and lasers will become scalpels.(2:--)

Several reports predicted numerous significant medical technologies for the 1990s. Some examples include using artificial intelligence for diagnoses, genetic screening to determine the baby's sex and to predict genetic diseases, having the capability to repair nerves in the spinal column, artificial blood, electromagnetic techniques to improve bone regeneration, and genetic techniques to regenerate limbs.(15:137, 139; 43:--; 47:32; 155:1; 4:A3; 150:77) Figure 34 shows a partial list of currently available man-made medical materials used in medicine.(72:24)

Chemicals and prescription drugs will revolutionize medicine in the 1990s. One report predicts that new non-narcotic drugs will be available in the 1990s to "improve

1. Hydrocephalus shunt carries "water on the brain" by catheter to the abdomen to be reabsorbed.
2. Plastic eye lens implant
3. Orbital floors replace damaged bone for the support of the eyeball
4. Artificial hearing system implant
5. Artificial ear
6. Nose implant for cosmetic reshaping
7. Mandibular titanium mesh creates a foundation for reconstruction of the jaw
8. Titanium dental implant allows bridge to be attached to the jawbone
9. Artificial chin (solid or gel-filled)
10. Shoulder prosthesis mimics bone structure
11. Artificial larynx
12. Artificial skin
13. Artificial heart and heart valves
14. Heart pacemaker
15. Breast implants for reconstruction
16. Hinged elbow implant to be hinged to bone
17. Artery and vein grafts
18. Spinal fixation device to fasten vertebrae together after injury or surgery (being tested)
19. Absorbable pins fix bone or cartilage fragments and do not have to be removed
20. Hip implants uses a zirconia ceramic ball on a titanium-alloy stem grows into the bone tissue
21. Artificial blood
22. Artificial finger/toe joint
23. Teflon ligament replacements
24. Wrist implant replaces damaged bone
25. Temporary tendon replacement
26. Artificial leg flexes at knee, ankle, and arch
27. Adjustable implant for the femur in children that can be easily adjusted for growth of the leg bones
28. Soft tissue patch to replace chest or abdominal tissue when the patient's has become inadequate because of disease
29. Artificial arm that uses muscle contractions in remnant arm to activate electric impulses that flex the elbow and wrist and open and close the hand

Figure 34: Man-Made Replacements for the Body
(42:54-56)(72:24)

intellectual cognizance and awareness, and personality changes."(15:139; 47:32)

Computers

Computers will be a part of virtually every aspect of life in the US in the 1990s. In 1986 only 18 percent of US homes had computers. By 2001, 70 percent of the homes in the US will have a computer, 75 percent of them will be involved in telecommunications, and "computer competence will approach 100 percent."(47:34-35; 79:cptr IV pg. 7) Personal computers will begin to be linked globally in the 1990s.(125:--)

Computers will be widely used in education and training, and diagnostics in the 1990s.(15:143)

Computer speed and capability will increase several hundred fold in the 1990s.(88:30; 98:1; 179:109) In December of 1989, one computer scientist predicted that "computers are getting 1,000 times better every 20 years."(43:--) Another source predicts that computer speed will improve "100 fold" in the 1990s, by using optoelectronic integrated circuits, and biological computer chips made of chlorophyll.(15:142)

Shortly after the turn of the century, laser driven computer systems will be able to process data at the speed of light--200 times faster than today.(83:9)

Artificial intelligence and expert systems will become much more widespread in the 1990s.(24:11; 60:46; 15:117; 109:10, 22-23) By 2001, business and the government will use artificial intelligence extensively to "help assimilate data

and solve problems." Expert systems will be prevalent in manufacturing, energy, automobile insurance, medicine, and legal industries.(47:31) Some of the biggest computer corporations, like IBM, Digital Equipment Corporation, and Hewlett-Packard, are quickly developing artificial intelligence capabilities.(154:D10) A program called Mycin can diagnose some infectious diseases better than humans.(153:39)

Materials of the Future

There will be "super materials" in the future that will be significantly stronger, lighter, more resistant, and more durable than today.(17:7) "High performance plastics and composites based on carbon fibers look likely to transform the auto industry." Cars and planes made almost completely of plastic could be developed in the future.(72:21) Revolutionary ceramics will be lighter, stronger, and more durable. Ceramic scissors, knives, batteries, and artificial limbs are on the market.(72:22) "Molecular weaving" processes allow such alloys. Ceramics are also being developed to conduct electricity.(129:129, 130) This breakthrough means that electronics can be much smaller and carry much more electricity than in the past. "For example, the world's most powerful computers, now the size of several tall filing cabinets, could come down to the size of a football, and probably operate 10 times faster."(92:2A)

Fiberglass/synthetic resin composites are possible in the 1990s, and would be as strong as concrete but would be 80 percent lighter.(79:cptr VII, pg. 12)

Space

Space technology, much of which will be conducted from a space station, will become more important in the 1990s.

(109:22-23) Space will be used for materials manufacturing, and for more accurate weather forecasting.(15:130, 133) NASA expects to begin work on a US space station in 1995.(26:5) In 1987, US House and Senate conferees agreed to fund at least \$425 million for the proposed space station.(91:2A) The president's 1991 budget increased NASA's budget by 24 percent to \$15.2 billion, and gave a one billion dollar increase in basic space science research. (74:12A) The proposed space station will be used for microgravity research, space biology and medicine, global climatology and geophysics, solar physics research, and as a staging platform for other missions.(133:A24) Other space programs include the National Aerospace Plane, an airplane that can fly at 25 times the speed of sound, reach low orbit, and reenter the atmosphere and land.(79:cptr VI pg. 13)

Other Technologies

Super miniaturization will be used in many industries in the future.(97:68) By 2001, electric motors will be 75 percent smaller and lighter than they are today.(47:31) Timothy Willard, Director of Communications for the World

Future Society, said in 1988 that we will have "shrinking technology" in the 1990s, including televisions the size of wristwatches, eight millimeter-wide videotape, and miniature satellite dishes that fit inside the home.(111:B1)

In the 1990s identification will be done by retina scan, vein patterns, and DNA fingerprinting.(97:78)

Superconductivity will begin to emerge in the 1990s.(83:9; 15:128; 42:760; 181:7) The superconducting supercollider laboratory is now under development and will be completed in Ellis County, Texas, in 1998.(26:67)

The next chapter addresses the military budget. While the strides the US military can take technologically are monumental, the fiscal ability to leap forward is limited by resources.

CHAPTER XI

THE DEFENSE BUDGET

Information related to forecasting future budget trends is a combination of past trends, the current budget situation, and predictions by credible sources. All three are valuable in determining the possible direction of budgets for the military in the future.

Military budgets in the past frequently fluctuate up and down. Retired Chief of Naval Operations, Admiral Watkins, said in 1987 that since World War II, military funding has been reversed 14 times.(119:28) Indeed, statistics from 1950 to 1987 show that the total Department of Defense obligation authority changed up or down ten times. Figure 35 shows one depiction of the budget fluctuations over time.

Military budgets respond quickly to significant security threats, and decrease quickly after the threat diminishes. (102:28) After World War II the defense budget dropped from \$625 billion in 1945 to \$100 billion (in constant 1988 dollars) immediately after the war.(119:29) At the beginning of the Korean War in 1950, the defense budget jumped 400 percent, then fell almost 800 percent immediately after

<u>YEAR</u>	<u>AUTHORITY</u>	<u>YEAR</u>	<u>AUTHORITY</u>
1951	277	1971	226
1952	362	1972	219
1953	298	1973	209
1954	218	1974	201
1955	190	1975	194
1956	193	1976	202
1957	202	1977	212
1958	198	1978	209
1959	210	1979	209
1960	203	1980	213
1961	204	1981	240
1962	235	1982	268
1963	237	1983	289
1964	227	1984	303
1965	218	1985	326
1966	261	1986	312
1967	285	1987	302
1968	289	1988	293
1969	278	1989	291
1970	251	1990	297

Figure 35: Trends in Defense Budget Authority, FY 1951-90, in Billions of Fiscal Year 1989 Dollars(102:10)

the war.(64:58) Soviet entry into the nuclear club sparked large outlays for intercontinental ballistic missiles (ICBMs) development and fielding in the mid 1950s.(30:14) The Soviet Sputnik launch in 1957 prompted a 6 percent jump in the budget.(119:29) The military budget during the Vietnam era topped \$280 billion in 1968 (1988 dollars), and stayed high until the major troop withdrawals in 1972. The budget immediately plunged to below pre-war levels and continued to move lower until 1976.(119:32)

Since 1947, the defense budget never grew in real terms for more than three years in a row until the 1980s. (119:28) Further, the increase or decrease never ran more than three years without a reversal until the 1970s through the 1980s.(64:58; 102:10)

Non-war year average budgets in constant dollars never dropped below \$200 billion and never exceeded \$292 billion. The non-war years are considered to be 1954-60 with an average budget of \$202 billion, 1961-65 with an average of \$224 billion, 1973-80 with an average of \$206 billion, and 1981-90 with an average of \$292 billion.(102:10)

A major force shaping the future defense budget are developments in the Soviet Union and parts of the world heavily influenced by their actions. See chapters VI and XII for supporting data.

A major force shaping the future defense budget is pressure to increase spending for domestic concerns. In his

January 1990 State of the Union speech, President Bush proposed major increases in his FY 91 budget for domestic areas such as NASA's space program (up 24 percent), education, programs to combat narcotics (increase of 11.6 percent), and the environment.(146:1A; 142:5A) While it is true that he also proposed to reduce some other domestic programs like medicare, mass transit, and student loans, Congressional leaders are saying that domestic nonmilitary spending must increase more.(146:1A) For instance, Senator Joseph Biden claims that the president's budget for the so called "drug war" is too low, and wants \$14.6 billion for it, an increase of \$4 billion over the president's recommendation.(142:5A) Speaker of the House Foley wants more for education.(93:10A)

Such rhetoric may be considered just politics, except that the president made five major comments that form the thrust of his FY 91 budget--and all but one of them was domestic rather than security related. The lone exception was the proposal for major cuts in defense. First, he said that drugs are "this nation's number one concern."(142:5A) Second, he's "committed to bringing the staggering cost of health care under control." Third, the federal government would help "improve child care alternatives for parents." Fourth, he set goals to dramatically improve education levels in the US so that "by 2000, US students must be first in the world in science and math." And, lastly, his only major comment about defense other than to announce his two percent reduction in

the defense budget, was to propose a massive troop withdrawal from Western Europe of some 60,000 troops.(44:--)

A major factor affecting the future of the defense budget is the Gramm-Rudmann-Hollings bill. This law requires a balanced federal budget by 1993.(102:10; 146:14A)

Historically, budget cuts have come from procurement stretchouts and by reducing operations and maintenance accounts. After Vietnam, severe budget reductions for defense came "by reducing certain marginal support functions or assigning them to cheaper reserve forces."(118:32) In the 1970s, much of the budget reduction came from delaying purchase of munitions, supplies, reducing training and facility maintenance, and slowing personnel costs. The most protected budget items were the future programs. They were often saved at the expense of operations and maintenance. The same conditions existed in 1986, when the FY 86-90 budget had to be cut \$452 billion. None of the most costly programs were cancelled, except the Air Force's plan to increase the number of tactical air wings from 36 to 40. In 1987, Congress took only 8 percent of the necessary cuts by programmatic changes, and a third by stretching out procurements.(119:32-33; 102:5)

Increases in defense spending in the 1980s emphasized investment; therefore, operations and maintenance costs are thrown into the future. The result is a need for higher operations and maintenance costs in the 1990s just to keep up with that investment, even if no new investments are

introduced in the 1990s. (102:3-4) While total budget authorization for defense from FY 80-85 increased about 53 percent in real growth, investment items like research and development and military construction increased 100 percent.(102:3-4) If the 1989 military force structure did not change, the costs to just keep it operating would cause a projected deficit of over \$200 billion by 1994, given the 1990-94 budget proposal.(102:i) In late 1988, the investment firm Prudential-Bache reported that it would cost the government three to five percent above the predicted four to five percent inflation rate just to maintain its existing force structure in the following years.(118:30)

The American public wants a lower defense budget. A 1989 Brookings Institute report found that the key issue regarding the defense budget is "not ability to pay but the willingness of the American taxpayer to sacrifice the goods and services to provide for more defense. . . . At this time they show no such willingness; indeed, most opinion polls indicate that 84 percent believe defense spending . . . is about right or is too high."(102:9) A 1988 poll by ABC News and the New York Times showed that 56 percent of those polled wanted a defense budget freeze.(118:30) These reactions occurred after the military budget had already undergone several years of real reductions.(102:9)

The years 1980-1985 saw the longest period of gains in the defense budget, and the period from 1986 into the 1990s

may well be the longest period of reductions. (119:28)

Predictions from many sources indicate either flat or reduced defense budgets into the 1990s in terms of real growth. (68:2; 31:--; 78:--; 139:10) "Relative austerity will become the norm" for defense budgets from now through 1995. (135:3) The Brookings Institute in early 1989 said: "Exactly what its targets will be for the next five years (FY 90-94) is not yet certain, but the best that the Defense Department can probably hope for is a real freeze, a budget that will grow only by the amount of inflation. (102:7) One November 1988 prediction estimated the military budget would be flat at about \$300 billion "for the next several years." (118:29) General Colin Powell, current Chairman of the Joint Chiefs of Staff said in February 1990 that defense reductions will occur at a rate of "several percentage points a year for the foreseeable future." (141:8) Secretary of Defense Cheney, while commenting on the president's FY 91 budget, said that the Pentagon's five year plan would reduce defense expenditures to the lowest point as a percent of GNP since World War II. Proposed actions included reducing at least two Army divisions (maybe three more if arms talks are successful), and closing 60 military installations. (146:--) Even forecasts to 2010 indicate a rather continuous downward trend. (32:2; 33:4)

Priorities in defense for the 1990s will probably emphasize readiness above modernization, force structure, and sustainment. In February 1988, as the new Secretary of

Defense Carlucci prepared to make substantial cuts in the defense budget, he announced that his first priority for defense spending was readiness.(102:17) The current Secretary of Defense, Richard Cheney, made the same announcement in July 1989 as he prepared to decide on defense reductions.(170:--)

The next chapter discusses the nature of conflict in the future and the nature of the US military. The next 10 years promise many changes in both areas.

CHAPTER XII

THE US MILITARY AND CONFLICT

World and domestic events indicate the US military will change significantly in the 1990s. Forecast information presented in earlier chapters gives some insight into those changes. This chapter shows specific changes that are likely to take place in the US military, based on recent events and insight into the future from a variety of sources.

There will be fewer military bases, particularly overseas bases.(33:3) The Air Force Long-Range Planning Office (AF/XOXWP) forecast this situation in their 1988 view of the US Air Force of the future.(49:--) The Army's Long-Range Personnel Plan made the same prediction.(110:16) The basing agreement in the Philippines expires in 1991, and is then subject to a one-year termination notice.(64:10) As late as February 10, 1990, the US Ambassador in the Philippines, Nicholas Platt, expressed the opinion that US forces would eventually move from the Philippines. One of his officials said: "We know the question is not if we leave. It's when and how." Some in Washington expect a 5 to 10 year phase-out of forces there in the near term future.(65:12A)

The Panama Canal Treaty requires all US bases in Panama to close by 1999. Further, basing in the Azores may become more restrictive in the 1990s.(64:10) The troop reductions in Europe discussed in chapter VI strongly suggest fewer European bases if force strengths are cut dramatically. One source suggests that the stateside bases remaining will be primarily in Texas and Florida, with overseas bases in Hawaii, Alaska, Puerto Rico, the Pacific and the Indian Ocean area, Australia, Italy, Turkey, Guantanamo Bay, and Australia. It is likely that there will be one new base in the Middle East.(33:12) One report states that "some allies--Greece, Spain, and Portugal among them--are increasingly reluctant to provide bases that ease the projection of power."(172:46) The 1987-88 Commission on Integrated Long-Term Strategy, chartered by the Secretary of Defense and The Assistant to the President for National Security Affairs, states that access to overseas bases and overflight rights is "increasingly difficult and politically costly."(64:10)

There will be a much smaller active duty military force in the 1990s. The Air Force Directorate of Personnel Plans (AF/DPX) forecast this situation in their 1988 future forecast for personnel in the 1990s.(45:3-239) The Army's future assessment agrees with the Air Force.(110:16) President Bush, in a February 1990 interview, said, "If you have a radical troop change in Eastern Europe, you will have a

very different requirement for a US presence in numbers and for an allied defense posture."(103:34)

During the 1990s, mandatory national service for young adults may be required by law.(68:5; 97:80) One source suggests that young adults will have to work for at least two years in one of three areas: military, work programs for the disadvantaged, or the Peace Corps.(47:30)

The US military will depend much more heavily on technology in the 1990s than in the past.(159:7; 73:15; 33:6-7; 57:9-12) The Army predicts that future weapons will be far superior from today's, and will permit much better reconnaissance and target acquisition because of technological advancement.(17:6) Weapons will be much more accurate, have longer range, and incorporate stealth technology in the next 10-20 years.(33:6) Military forces will depend more heavily on automation, computers, artificial intelligence, and robotics in the future.(110:17; 57:9) Developments in microelectronics will be particularly significant in sensors, information processing, and directed energy weaponry. Stealth technology will also be significant.(64:8) The bottom line of improved technological advances is that conflict will become more violent and lethal.(17:4; 110:2) Another source suggests that the biggest military advances in technology from 1985-2000 would be in computers, telecommunications, surveillance systems, target acquisition, stealth, navigation and guidance, and in transportation.(73:18)

The force of the 1990s will be more mobility
capable (83:17; 33:3,5; 56:40; 17:6; 109:9; 49:--)

US forces in the 1990s will become much more "joint"
and "combined" than ever before. (33:4; 110:3; 162:13) The
Army strategic plan explains that in the future "all
contingency operations will be joint; some combined." (83:17)
The Air Force Long-Range Planning Office agrees. (49:--) The
DOD logistics goals to 2010 have milestones that require
allied agreements to use allied airlift assets to move US
forces and equipment. It also requires the services to
develop international standards for fuel, so that there will
be a single fuel for ground and air operations (except carrier
based air). (109:14, 16) One report states that sharing the
burden for defense in the future "will shape the defense
posture (troops overseas . . . military foreign aid, dollar
values, etc.)." (68:3)

US forces will fight on intensely lethal
battlefields. (17:4; 159:7; 110:2) The Army is developing more
lethal weapons for deep attack. (83:18) The section of this
chapter forecasting the increased reliance on high-tech
weapons and research material in chapter X, support the
forecast that the future battlefield will be more lethal.
Further, the forecast information in Chapter IX describes
weapons proliferation, including conventional, nuclear,
chemical and biological.

The possibilities for the future are endless. However, for decision makers to be effective, they must understand the range of future possibilities, like those described in the last several chapters. The next question integrates these insights into meaningful implications for AWC. The following chapter makes that integration.

CHAPTER XIII

IMPLICATIONS OF THE FUTURE ENVIRONMENT FOR THE AIR WAR COLLEGE

The future insights presented in this study probably would not surprise anyone who is reasonably well-read. Indeed, since many future circumstances are evolutionary rather than revolutionary in nature, it is only natural that people recognize trends in current literature, through television news, and by everyday experiences.

The most significant information derived from these insights comes from the *interpretation, blending and application* of them in terms meaningful to the decision maker. For it is the decision maker, who must pass judgment on their validity and usefulness in making today's decisions. In other words, the integrated analysis of the forecasts presented in this study must answer the relevancy question posed in chapter II: "What does this mean to me?" This chapter answers that question.

The Air War College Student Of the 1990s

Based on the insights shown in this study, the AWC students of the 1990s will be in their early 40s, married, and

all but 10 to 15 will be lieutenant colonels. They will have experience at installation, major command, and Headquarters Air Force or higher levels. They will have 19 years time in service.

Primarily due to the impact of the 1988 Congressional study of PME and changes in the military operating environment, the mix of students in a student body of 240 will change. There will be 57 Army, 57 from the sea component (Navy, Marines and Coast Guard), and 35 international students in the class. There will be seven to nine civilian students. The remaining 76 to 78 students will be Air Force, including officers from the reserves. The reserve student population will increase to 10 from 5 to 7 today, as the reserve components increase their share of US military capability. There will be 10 to 12 women, and 5 to 7 blacks and hispanics in the class.

During the next five years, the degree of prior knowledge about the branches of service, previous work in the joint arena, and an understanding of international affairs will vary greatly among students. This diversity will occur because of changes in the student body, and adjustments in the curriculum taught in intermediate PME schools during the previous five to seven years. The vast majority of students will have masters degrees, but the percentage will be slightly lower than the class of 1990. There will be a few students without bachelors degrees, and the number with higher than a

masters degree will increase, especially among those in basic sciences and computer technology.

Combat experience will be virtually nonexistent among US officers. International officers will bring most of the combat experience, primarily from low intensity conflicts. A number of US officers will have experiences closing US bases or managing large-scale mission changes at US installations.

Officers will have supervised younger officers or enlisted personnel with markedly different values and outlooks than their own. Many of those they will have supervised will have come from homes where their parents were divorced, and a large number will have been raised by a single parent. Non-parent care while the parents worked will have been the norm for these workers when they were children. In most cases, their childhood will not have been similar to that experienced by these students.

The work force that they will have supervised will have more women and minorities than the force supervised by today's students. Most of those they supervise, and many of the students themselves, will use out-of-the-home care for their children.

The military work force will be a combination of two extremes--those highly educated and high-tech oriented, and those with little education who need extensive training to do their job. Most will work with computers, and some with robots or highly sophisticated diagnostic equipment.

Substantial upgrade in skills or new job training will occur every four years.

Students will have spent the first half of their careers in an environment of growing budgets. The last half of their careers, and the part where they had significant management responsibility over budgets and assets, will have been spent in an environment of austere budgets, with part of it managing forces and other resources that were being reduced, eliminated or moved to the reserve forces. Students will have experienced the stress of complex, multidisciplinary, high stakes and time-critical decision making in previous jobs. They will have been pressured by superiors to perform as if budgets were growing and resources plentiful.

There will be a significant increase in the number of students who are nonrated. This change will be due to increased numbers of sister service students, and the probability that more officers in high-tech support jobs will attend AWC.

The typical US student will have a spouse who worked outside of the home for a number of years before moving to Montgomery. In many cases the spouse worked in professional career channels, rather than part time or as a semi-skilled worker. Typically, the family income will have been reduced significantly by moving to attend AWC.

Some students will have elder care responsibilities, either in their own home, or through financial support. Air Force families will have moved fewer times than previous students. This phenomenon will be due to budget-driven changes regarding permanent change-of-station rules. In addition, students in high-tech specialties will move less often, and there will be more reserve students. Many students will have been divorced before their current marriage, and will have children by previous marriages living with them or with their ex-spouse. There may be a few single parents in the class.

Almost all US students will have some computer knowledge, most all will have operated computers at work, and most will own a personal computer. They will be highly sophisticated and more independent-minded than today, largely because of changing values in America, more responsibility being placed on them due to military drawdowns and the effects of decentralization, and the participative management styles developed in the military. Many will have been trained in or exposed to advanced technology in previous assignments.

The Air War College in the 1990s

The college will still function as the senior school for Air Force officers. As recommended by the 1989 Congressional report on PME, AWC will reduce the number of lectures and "passive" contact time. The curriculum will have

more case studies, computerized wargaming, and small group problem solving sessions.

School will still be held in building 1401, which is scheduled for a major renovation in FY 94. The faculty will be smaller but will be more civilianized. Students will want more insight into rapidly changing geopolitical conditions in the world. There will be conflicting information and opinion about threats to US security, national military strategy, and the best way to employ military forces. There will be attempts to improve the quality of the military faculty, but the assignment system and perceptions about the school's quality outlined in the 1989 Congressional report on PME will thwart these attempts. Efforts to improve pay and benefits for civilian faculty may be put in effect, but ultimately will not succeed because of budget reductions.

There will be efforts to eliminate Air Command and Staff College and the Army's Command and General Staff College. If these efforts succeed, the AWC will have to teach the most important parts of the intermediate school's curriculum to establish the foundation needed to educate officers in the joint and combined arms arena. The other alternative would be to lower the AWC educational goals, or extend the school's duration. In any event, the curriculum will require extensive and frequent adjustment for a variety of reasons: changing world environment and threats that alter approaches to military problems; the state of flux most

certainly to occur as a result of changes in the international scene, and the effects on military posture and strategy from reduced budgets and the geopolitical situation. During the next 5 to 7 years there will be efforts to make the three service schools into joint schools like the National War College. There are three reasons for this prediction. First, the number of sister service students will constitute 50 percent of the student body at the services' senior schools, if they adopt the 1989 Congressional report on PME's recommendation. By considering these students, and the international and civilian students, there will be many fewer students from the host service. Second, the curriculum suggested in the study recommends a focus on *national* military strategy. That implies heavy emphasis on joint operations. Third, the significant changes in international relations will likely cause more emphasis on combined military strategy and operations with US allies. Such strategies will no longer be those of post World War II--the Soviet threat in Europe or the defense of Korea. There will be new challenges, many of which will be in the lesser-studied areas of low intensity conflict.

Despite possible efforts to maintain adequate funding for AWC in the next year or two, AWC will operate on a reduced budget in real terms compared to today. The budget decline in the 1990s will affect AWC. The school will not only be affected by AU's fair share of the budget reduction, but will

have to compete even more intensely than in the past with high priority budget items and "must pay" bills.

The Air Force in the 1990s

The Air Force of the 1990s will be considerably smaller than today. There will be fewer bases stateside and overseas. More and more bases will become dual-use activities with civilian airports jointly using the runways and ramp space. Remaining bases will become larger as flying and nonflying missions are moved from bases that will close.

Most of the weapon systems in today's inventory will still be in operation. The smaller force will concentrate on readiness at the expense of size and long-term sustainment. Some research and development will be curtailed, but new systems will still be under development, and development of advanced technology will flourish. Strategic and low intensity strategies will be the main focus of military activities, and the Air Force will have participated in one or more conflicts in a third world nation in the 1990s. The government will use the military more and more for nonmilitary operations like community service, civic actions, and disaster relief. The military will increase its role in the drug war.

The Air Force will spend a greater percentage of its budget on training. Besides readiness training, personnel will need equipment upgrade training; training to operate new technological systems; and crosstraining as jobs are civilianized, automated or eliminated.

Procedures and operations will become considerably more joint oriented. There will be renewed efforts to have only joint directives within the Defense Department, where the requirement for directives is not specifically service unique. There will be an increase in exchange assignments among the services.

Efforts to reduce the military budget will result in proposals to eliminate base housing, clubs and recreation activities, commissaries, and exchanges within the military system. Some of these efforts will succeed. Other efforts include consolidation of major organizations or functions under one agency or executive agent. Health care will be contracted in large metropolitan areas to private health maintenance organizations. A major effort will be to increase child care facilities and capabilities on bases well above those existing today.

The ratio of officers to enlisted will increase as organizations become flatter and more responsibility is decentralized. Formal efforts to improve quality will fail because of bureaucratic systems that create reporting and tracking layers. The Air Force budgeting process will undergo major revision because of significantly reduced staffs. There will not be a shortage of young recruits for the Air Force because the manpower requirement will be significantly lower in the future. The Air Force will eliminate numbered air forces and air divisions to streamline bureaucracy. As the

Air Force has a larger divergence of high-tech versus low-tech workers, there will be increasing pressure to revise military pay according to demand for skills and training investment. Military scientists and computer experts will be given bonuses like pilots and physicians.

The AWC leadership has a number of significant strategic issues to address as a result of changes expected to take place in the future. This study provides the catalyst for thinking about such issues, and about developing plans of action to take advantage of the opportunities that lie ahead. The last chapter in this study proposes a series of issues that AWC decision makers should use as a starting point for further discussion on the question: "What do I do about the future?"

CHAPTER XIV

STRATEGIC ISSUES FOR AIR WAR COLLEGE

The future always offers opportunities and challenges. In the final analysis, people determine the direction of the future by the choices they make. It is no different for AWC. Though much of the environment is beyond the control of AWC leadership, how well the school operates in that environment will largely be decided by the quality of decisions made today and the degree of forward-thinking that goes into each one.

This chapter presents strategic issues derived from information in the previous 13 chapters. Each issue is designed to cause AWC leadership to pause and reflect on its merits. Whether any of these issues makes it beyond the text of this study is not important. What is important is the stimulation this author hopes they stir in the minds and hearts of those who must lead this school, and whose decisions will have significant impact on its operation, and on the graduates it produces long after those leaders are gone.

Bring technology to AWC. The future promises to be one of constantly changing technology. This school's purpose is to instill knowledge into future senior officers on how to

lead the people and resources to protect the United States through the projection and use of airpower. Technology is integral to that capability. AWC-sponsored technology workshops, symposiums, or vendor displays throughout the year would let students see the technology they will use or support in the future. The Computer Support Center at Gunter should help with computer technologies. AWC could also volunteer, with the AU Commander's approval, to test appropriate technology at Maxwell. Whether it is office technology or flightline technology, AWC should add technological education to the curriculum, either formally or informally. The school should also consider developing interactive video disc or other computer-aided instruction material. This resource is excellent for material like history or the national strategic decision-making process, since it does not change. Sharing costs with other military schools could easily make development feasible.

AWC students have different values and expectations than many of those they will lead. The school should arrange for students to get feedback from junior officers, and perhaps enlisted personnel on their values, goals, and expectations. AWC could ask students at Squadron Officer School (SOS) and ACSC to meet with students so AWC students can ask them questions in an informal and nonthreatening atmosphere. The current system of exchanges does not have that objective. The

school could invite cadets from the Air Force Academy for the same purpose.

AWC needs to determine how the Air Force and AWC systems impact on the officer corps as a whole. The questionnaires and data collected on students is not useful for decision making. This point need expansion. Currently, only statistical data of the most rudimentary type is collected on students. There is no information on their family situation (children and ages, stepchildren, minor children living in other areas, spouse working before the move or expecting to work after the move, degree of financial burden on the family to move for one year, etc.). There is no data base on those who were chosen to attend, but elected not to do so, and their reasons. Did the fact that they chose not to attend, and the subsequent denegration in their record force any of our best officers to prematurely curtail an otherwise valuable career because of the Air Force system? Finally, there is no current information on how long an AWC graduate remains on active duty or continuous data of any degree of detail on the types of jobs they held after graduation. In other words, what does the taxpayer get for the investment? The uses of such information could easily be the subject of another study. However, in view of the future changes presented in this study, AWC leaders need more information about those they educate, and the impact of AWC on the Air Force.

AWC must develop a method to quickly make major curriculum adjustments to accommodate rapid world change, and the uncertainties of military strategies predicted for the 1990s. Education may be based on history, but history appropriate for military education in the 1990s is happening now. Strategies appropriate for Europe and Korea that have existed for quite a while may well change dramatically--and change several times in the next decade. Probable discussions at AWC will no longer be what is the strategy for certain situations, but, what should our strategy be changed to based on what happened last week? Stagnating curriculum in a changing world will not provide modern education to military warriors.

AWC should begin to address the question of the value of the school to those from sister services who attend. The question may appear to be obvious, but the curriculum changes dictated by the 1989 Congressional report on PME, and the significantly larger number of sister service students requires revisiting this issue. Further, with more Air Force officers attending Army and Navy senior schools, where will AWC rank among the three as the place to go for excellent military education?

AWC should consider the possibility that some schools for senior military leaders may close in the 1990s. There are five schools to support education for lieutenant colonels and colonels in the US military. Will Congress or OSD permit all

of them to continue given the probable future outlined in this study? What are the advantages of keeping an Air Force school, when less than a third of the Air Force students who will attend a senior school in a few years will go to AWC? Perhaps those who attend non-Air Force schools will have a better education in future joint arenas than those who hear more about their same service.

AWC should evaluate strategic reorganization to include pooling experts among the three officer PME schools.

The probable long-term budget decline will probably mean reduced faculty in the long run. Implementing the findings from the 1989 Congressional report on PME means developing a building block approach to officer education. Rapid changes in the world situation will mean the schools will have to quickly adapt curriculum. The most economical and effective way to do that is to pool resources where the subjects taught are in similar categories like leadership, international affairs, and the national security process. Commandants must give up their narrow control of these resources, but should be able to task them for curriculum development and teaching. Further, the resources at CADRE and the other institutions at Maxwell and Gunter should be matrixed so all schools, including AWC, benefit from their expertise. For instance, if a quick change to curriculum is called for in the AWC curriculum, the school can request help from several sources to make the changes. Management of these resources would

become more complex, and the matrix approach is not one the military normally uses. However, given the circumstances AWC faces in the future, and the availability of resources centrally located in Montgomery, this approach should be considered to improve the school's operation in the future.

Replace the leadership phase of AWC instruction with one on decision making. The enduring purpose of AWC clearly shows that one of the main expectations of AWC education is the ability to think creatively and make complex decisions. One could argue that the military strategy phase or the leadership phase of instruction does that. However, it fails to provide the proper educational models for decision making in peace and war for the myriad of decisions facing senior leaders. The explosion of information expected in the 1990s, the drastic changes in geopolitics and the military structure, the challenges of managing people with different outlooks on life, and the fast pace of technology makes improved decision making critical.

AWC should invest in teleconferencing, even at the expense of faculty and staff. Teleconferencing facilities exist at Wright Patterson AFB, and are planned for the Washington DC area. Areas with concentrations of potential AWC students include San Antonio and Ramstein AB Germany. With contact time expected to be reduced, and technology allowing long distance teaching, teleconferencing could easily pay for itself by reducing the overall cost per student

significantly. Teleconferencing also shows AWC as the innovative and forward-thinking PME school.

AWC should pursue gaining accreditation so that courses completed can be applied toward degrees at colleges and universities beyond those in Alabama. The Air Force advertises quality education at AWC. The tangible mark of quality in education circles appears to be accreditation. Further, students will have an additional incentive for attending school in residence.

AWC should develop an ability to continuously develop insights into the future to take advantage of opportunities. A system of contractors, taskings to CADRE, or use of students are possible alternatives to maintain contact with the future environment. Most large corporations have this ability. This capability enables the Commandant to strengthen his decisions by having insight into the probable future of the school's environment.

AWC is the link between the senior leaders of today and those of tomorrow. It must operate at the forward edge of thinking, technology, and innovation to keep up with events of the 1990s. To do that, AWC leaders must posture the school to take advantage of the opportunities presented by the future. The student audience the faculty and staff of AWC face will be a tough one--one demanding to be taught the right things to prepare them for the future. Clinging to the old when all

around is dramatically changing diminishes the ability of the school to fulfill its historical purpose.

Leaders need all the help they can get to make the tough choices facing them every day. The leader's decision-making tool box should always include a concept of the future. If this paper stimulates the AWC leadership to form such vision, or strengthen one already developed, it will have been successful.

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GLOSSARY

ACSC:	Air Command and Staff College
ACSC/XP:	Air Command and Staff College, Directorate of Plans and Administration
AF/DPX:	Headquarters, US Air Force, Deputy Chief of Staff, Personnel, Directorate of Personnel Plans
AF/LE:	Headquarters, US Air Force, Deputy Chief of Staff, Logistics and Engineering
AFM:	Air Force Manual
AF/PTR:	Headquarters, US Air Force, Deputy Chief of Staff, Personnel, Directorate of Personnel Training and Education (1961 Air Staff Organization).
AFR:	Air Force Regulation
AF/XOXWP:	Headquarters, US Air Force, Deputy Chief of Staff, Plans and Operations, Directorate of Plans, Long-Range Planning Division
AIDS:	Acquired Immune Deficiency Disorder
AU:	Air University
AWC:	Air War College
AWC/XP:	Air War College, Directorate of Plans and Programs
CADRE:	Center for Aerospace Doctrine, Research, and Education
CIA:	Central Intelligence Agency
COMECOM:	Communist Economic Community
EDI:	Electronic Data Interchange
E&S:	Air Force Engineering and Services
FY:	Fiscal Year

GNP: Gross National Product

GSA: General Services Administration

HMO: Health Maintenance Organization

HQ AU/XPXX: Headquarters, Air University, Directorate of Plans, Education Plans and Special Programs Division

HQ DA ODCSOPS DAMO-SSL: Headquarters, Department of the Army, Deputy Chief of Staff for Operational Plans, Directorate of Strategy Plans and Policy

HQ USAF/DP: Headquarters, US Air Force, Deputy Chief of Staff, Personnel

ICBM: Intercontinental Ballistic Missile

Maglev: Magnetic Levitation

MPC/DPMYI: Air Force Military Personnel Center, Directorate of Plans, Programs and Analysis, Computer Support Branch

NASA: National Aeronautics Administration

PC: Personal Computer

PME: Professional Military Education

PPBS: Planning, Programming, and Budgeting System

RTAG: Readiness Technical Advisory Group

SOS: Squadron Officers School

SYDP: Six Year Defense Plan

UMA: Arab Maghreg Union